NCR 7158 Thermal Receipt and Impact Printer

Release 1.0

Owner's Guide

B005-0000-1112
Issue D

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Preface

Important Information to the User

In order to ensure compliance with the Product Safety, FCC and CE marking requirements, you must use the power supply, power cord, and interface cable, which were shipped with this product or which meet the following parameters:

Power Supply

UL Listed (QQGQ), Class 2 power supply with SELV (Secondary Extra Low Voltage), non-energy hazard output, limited energy source, input rated 100-240 Vac, 1.5/0.8 A, 50/60 Hz, output rated 24 Vdc, 2.3 A.

Use of this product with a power supply other than the NCR power supply will require you to test this power supply and NCR printer for FCC and CE mark certification.

Interface Cable

A shielded (360 degree) interface cable must be used with this product. The shield must be connected to the frame or earth ground connection or earth ground reference at EACH end of the cable.

Use of a cable other than described here will require that you test this cable with the NCR printer and your system for FCC and CE mark certification.

Power Cord

A UL listed, detachable power cord must be used for this product. For applications where the power supply module may be mounted on the floor, a power cord with Type SJT marking must be used. For applications outside the US, power cords, which meet the particular country's certification and application requirements, should be used.

Use of a power cord other than described here may result in a violation of safety certifications, which are in force in the country of use.

How to Use This Book

Use this book as a training guide for teaching users how to operate the printer or as a reference for programming the host computer to communicate with the printer. In addition, information is also provided about the character sets and graphics that are available. The book is divided into chapters that relate to each of these areas.

See the Contents, or Index for detailed listings.

Who Should Use This Book?

This book is intended as a general guide for operators and supervisors who need to know how to use the printer. It is also intended as a technical guide for programmers and system integrators who need to know the technical information about the printer's communication and the programming commands used by the host computer to control the functions of the printer.

How to Obtain More Information

For more information about the 7158 printer and to order the following documentation, please contact your NCR supplier:

- *NCR 7158 Thermal Receipt & Impact Slip Printer Service Guide* (B005-0000-1113) - Service and disassembly procedures (you must be a trained service representative to service the printer)

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Revision Record

Issue	Date	Remarks
A	Apr 99	First issue
B	June 99	Minor Updates
C	June 00	Updates
D	Jan 03	Updates

Radio Frequency Interference Statements

Federal Communications Commission (FCC)

Information to User

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his own expense.

NCR is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by NCR. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user. The user is cautioned that changes or modifications not expressly approved by NCR may void the user's authority to operate the equipment.

Canadian Department of Communications

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectriques édicté par le ministrère des Communications du Canada.

Voluntary Control Council For Interference (VCCI)

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Chapter 1: About the Printer

Introducing the 7158 Printer

The 7158 is an extremely fast, quiet, and reliable point-of-sale printer. It consists of two specialized printers in one compact package: a thermal printer on top that prints receipts, and an impact slip printer in front to print on forms and checks that you insert. The thermal printer is optimized for ease-of-use in busy environments. There is no ribbon or ink cartridge to change, and you load the paper by simply dropping in a new roll. The impact printer provides the power and flexibility necessary to print on checks or multi-part forms up to five plies, in a wide variety of sizes and orientations.

The 7158 easily fits in anywhere. It connects to any host computer that uses the standard RS-232C interface. Other interfaces are also available. The printer's standard command set allows it to work with software written for NCR, or other ESC/POS™ compliant printers. A variety of sensors enable the printer to communicate its status, and the printer's journal is kept electronically by the host computer.

Several state-of-the-art check-handling options are also available. The Magnetic Ink Character Recognition (MICR) option enables the printer to read the special codes printed on checks and send this information to the host computer to verify the check. The Check Flip option saves transaction time by making check handling a one-step process—after reading the front of the check and printing on the back, the printer is able to flip the check over and print on the front of the check.

This section describes the printer's features and options in more detail.

Standard Features

Connectivity Features

Industry standard RS-232C interface for communication with the host computer; other interfaces are available as options.

- Cash drawer kickout connector and software support for up to two cash drawers.

Advanced Interface Design

- Sensors detect whether any of the covers are open, the paper is low in the receipt printer, or the paper is positioned properly in the slip printer.
- Software-controlled audible tone for various alerts.
- Online Configuration Menu—the printer guides the user through its configuration settings by printing instructions and a menu on receipt paper.

Electronics and Firmware

- Industry-standard command set makes the printer compatible with existing software, yet enables new features.
- Remote diagnostics capability tracks important printer data.
- 512K flash memory with 192K available for multiple logos, graphics, user-defined character set, and user data storage. The printer is also available with 1 MB or 2 MB flash memory for additional user memory.
- 16-bit electronics architecture.
- Communication rate up to 115,200 baud.
- Flash download mode lets the user upgrade the printer's firmware.

Thermal Receipt Printer

- Extremely fast and quiet thermal printhead.
- No ribbon or ink cartridge to change.
- Drop-in paper loading.
- Double high, double wide, bold, inverse, underlined, superscript and subscrip, italics, scalable and rotated print modes.
- Resident character sets: Code Pages 437 (US), 850 (Multilingual), 852 (Slavic), 858 (with Euro symbol), 860 (Portuguese), 863 (French-Canadian), and 865 (Nordic) and 866 (Cyrillic).
- Prints standard bar codes: Code 39, UPC-A, UPC-E, JAN8 (EAN), JAN13 (EAN), Interleaved 2 of 5, Codabar, Code 93, Code 128, and PDF-417 two-dimensional code. Also prints "ladder" bar codes.
- Host-selectable 44 or 56 columns on 80 mm wide "POS grade" thermal paper.
- 8 dots/mm print resolution.
- Up to 130 mm/second print speed.
- Optional receipt cutter.

Impact Slip Printer

- Bi-directional impact printhead designed for a very long life.
- Snap-on ribbon cassette.
- Prints on forms up to five plies.
- Horizontal flatbed slip table with an optional extension (which is standard with the MICR check reader option).
- Form insertion flexibility: insert forms in front or from the side.
- Form alignment sensors and LED indicator.
- Double wide and rotated print modes; a double strike print mode improves contrast.
- Software selectable pitch: either standard (13.9 characters per inch, 66 columns) or compressed (17.1 characters per inch, 80 columns).
- 290 lines-per-minute print speed.
- Optional check handling features (see "Impact Slip Printer Options" on next page).

Options

Connectivity Options

- RS-232C is supported on all printers. USB is also supported on some later models.
- Communications cables are available for RS-232C and USB.
- Power supplies are available in 55 Watt or 75 Watt versions.
- 3-pin to 6-pin power connection adapter to allow previous version power supplies (or terminal cables) to be connected to the 7158.

Thermal Receipt Printer Options

- The optional receipt cutter.

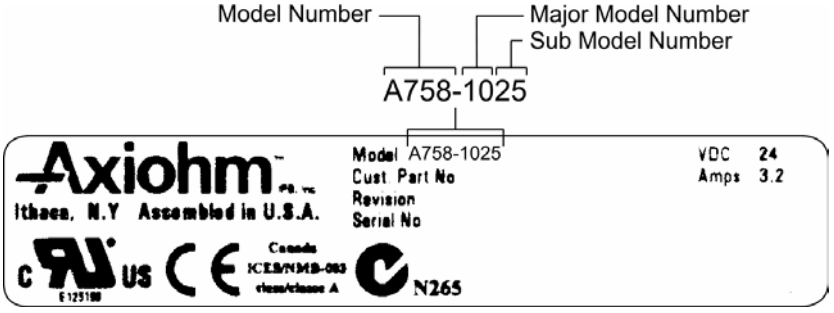
Impact Slip Printer Options

- The slip table is available in either standard or 2 extended sizes. An extended slip table is standard with the MICR check reader and flip options.
- The Magnetic Ink Character Recognition (MICR) check reader is built into the slip station. It reads checks that use standard E13B or CMC7 MICR fonts.
- Check Flip Option: after reading the MICR line on the front of the check and printing on the back, the printer is able to flip the check over and print on the face of the check.

Electronics and Firmware Options

- 1 MB or 2 MB Expanded flash memory is available as factory configurations.

Model Identification Key



A758 Model ID Key

A 7 5 8 - X X X X

- 1 = no knife
- 5 = knife

- 0 = no MICR
- 1 = MICR
- 2 = MICR and check flip
- 5 = check flip

- 0 = 512K Flash memory (standard)
- 1 = 1MB Flash memory
- 2 = 2MB Flash memory

- 1 = standard color

The set of options installed on a particular printer can be determined by looking at the printer's model number. The printer's model number appears on a label on the right side of the printer. Four-digit model numbers are assigned to the various 7158 models based on the following formula:

- The first digit indicates the release vintage and color of the printer's case.
- The second digit indicates the amount of flash memory installed in the printer.
- The third digit indicates whether the printer has the MICR and/or check flip features.
- The fourth digit indicates whether the printer has a knife for cutting receipts.

For example, a printer with model number 7158-1015 has a standard color case, 512K of flash memory, the MICR feature, and a knife for cutting receipts.

Chapter 2: **Setup Guide**

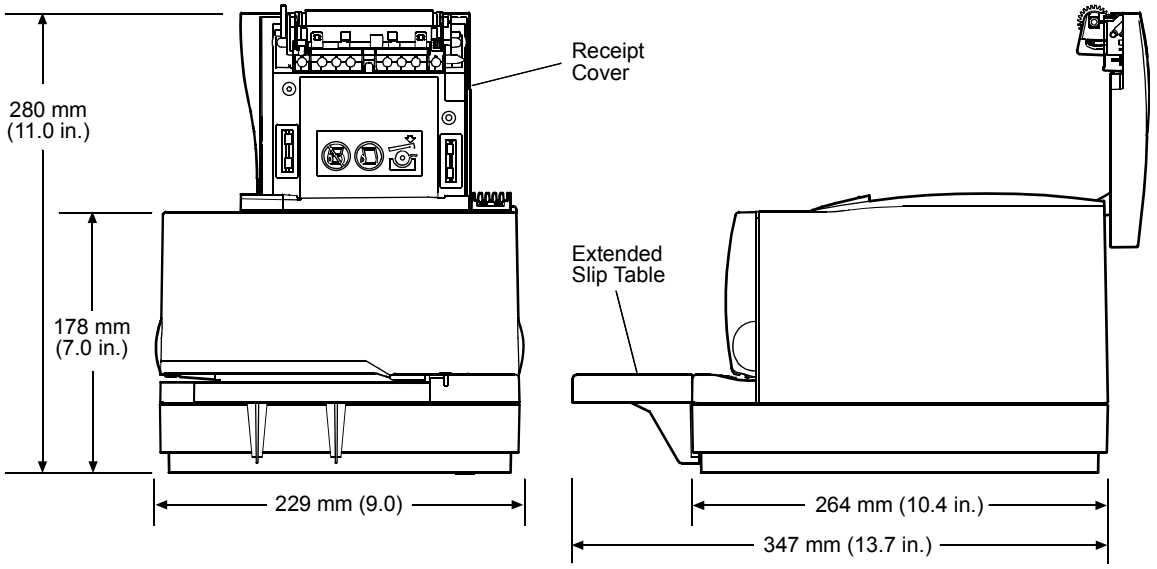
Unpacking the Printer

Save all packing materials in case you need to repack the printer. Check that the materials shipped with the printer match.

- Printer enclosed in a plastic bag and foam pack
- Thermal receipt paper roll (inside receipt bucket)
- Test printout protecting the printhead (inside receipt bucket)
- Cardboard support for cantilever (on slip table)
- Foam restraint for carriage (behind front cover)
- Power supply with cable connecting to printer and power supply cord connecting to power outlet (only if ordered with the printer)
- Ribbon cassette
- Installation report card (please complete this form and return to NCR)
- *7158 Thermal Receipt and Impact Slip Printer: Setup Guide*
- Communication cable, if ordered with the printer (from host computer to printer)

To report any missing materials, or to report a printer that was damaged during shipping, call your supplier or call an NCR representative.

Choosing a Location

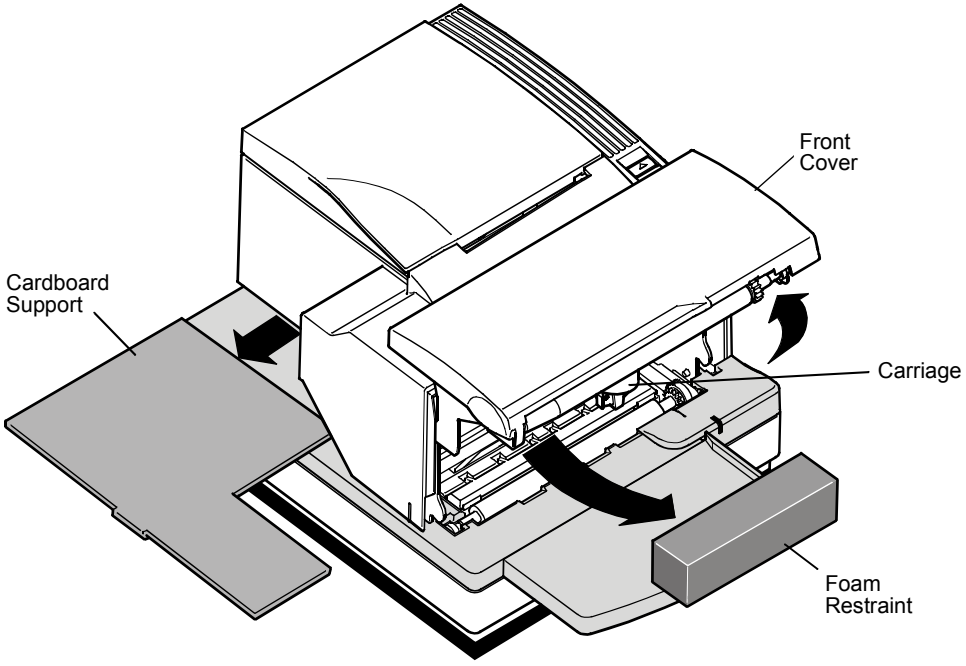


The 7158 printer takes up relatively little counter space and may be set on or near the host computer. With the RS-232C interface, you can place the printer up to 50 feet from the host computer and power supply.

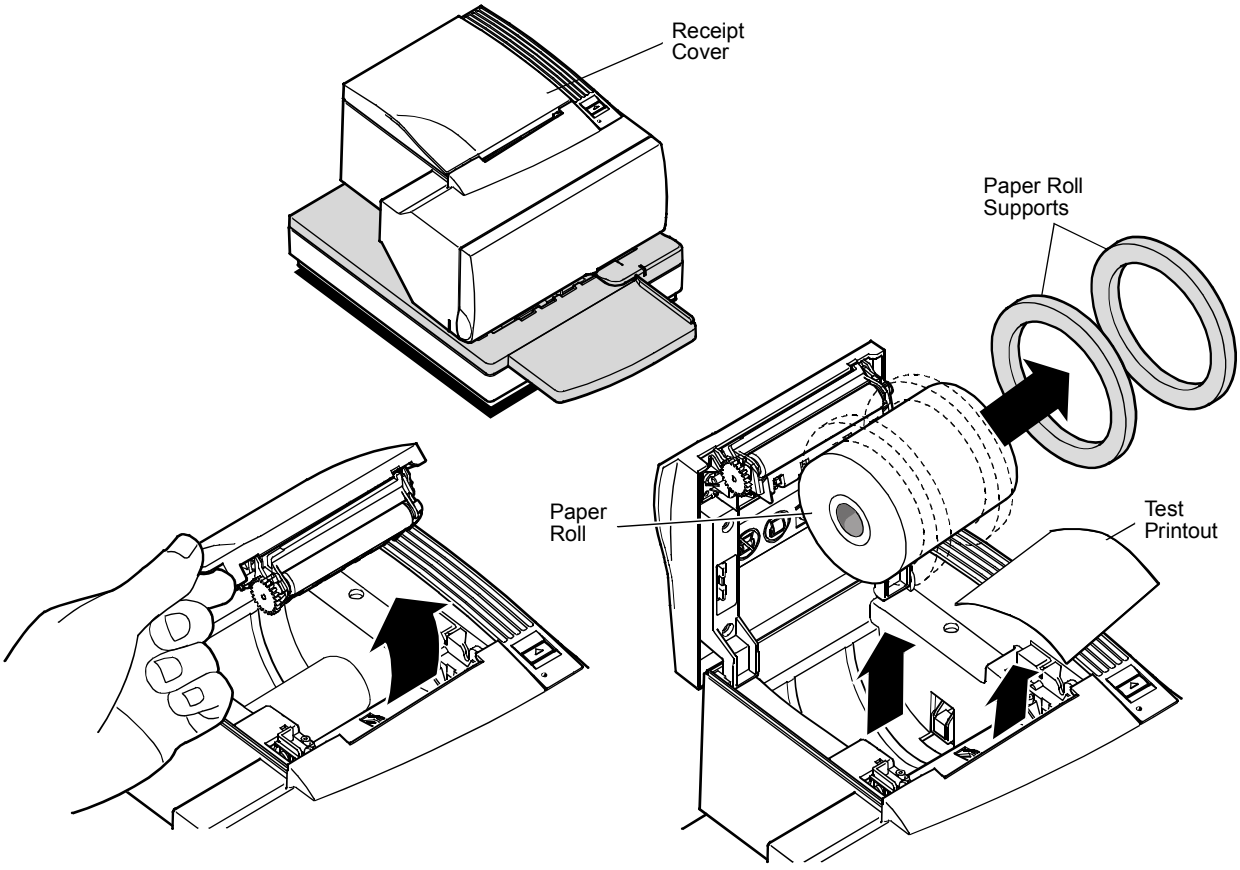
Place the printer on a level surface, and make sure there is enough room to open the receipt cover to change the paper and to open the front cover to change the impact printer's ribbon cassette. Leave several inches around the printer for connecting and accessing the cables.

If the printer has an optional Magnetic Ink Character Recognition (MICR) check reader installed, you may need to make additional adjustments to the printer's location. Because devices such as CRT monitors or large metal surfaces affect the printer's magnetic field, they can cause intermittent check reading errors.

Remove the Packing Restraints



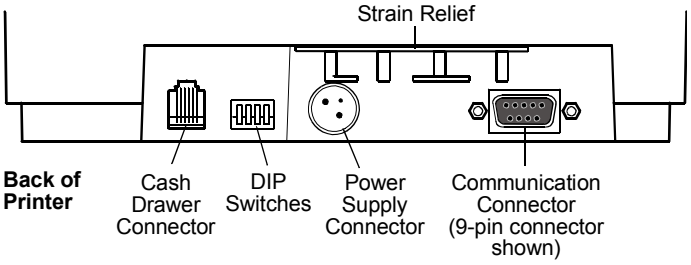
1. Open the front cover, remove the foam restraint holding the carriage.
2. Remove the cardboard support from the slip path.



1. Open the receipt cover and remove the test printout.
2. Lift the thermal paper roll out of the paper bucket and remove the paper roll supports.

Connecting the Cables

Caution: Connect the cables to the printer before plugging in the power supply. If power is received from the host computer, turn it off before connecting any cables.



Note: Depending on your printer configuration, the connector panel may vary from the above illustration.

Communication Cable

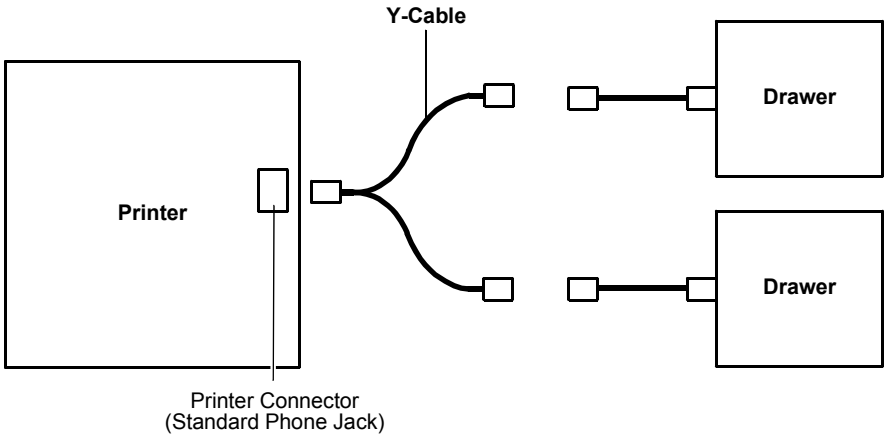
The communication cable connects the printer to the host computer. To install the communication cable:

1. Turn off the host computer.
2. Secure the communication cable to its connector under the printer in the location previously shown.
3. Connect the cable to the host computer.

Cash Drawer Cables

The cash drawer cable connects the printer to one or two cash drawers.

1. Plug the cable into the cash drawer connector (standard phone jack) located at the rear of the printer.



Note:

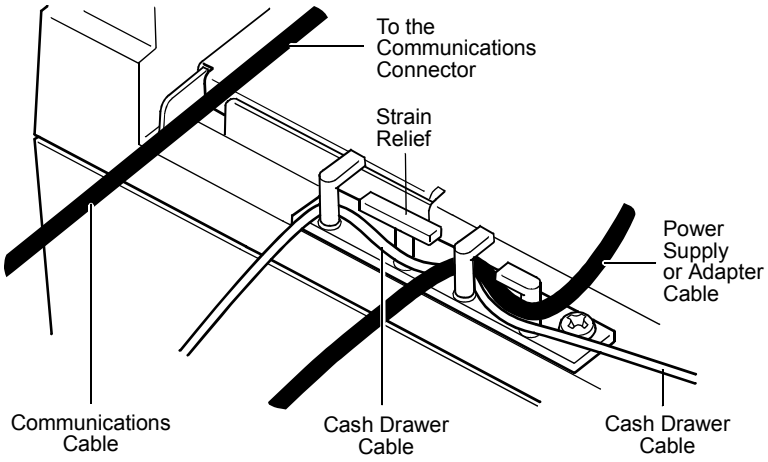
a. If your system has two cash drawers, attach a Y-cable to the printer's cash drawer connector as shown.

b. Leave some slack in the cord to route through the strain relief at a later time.

Power Supply Cable

Connect the power supply cable last.

1. Plug the power cord into the power supply.

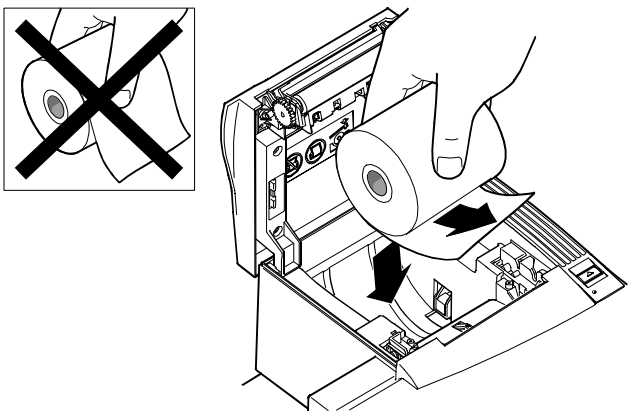


2. Route the cash drawer and the power supply cables through the stain relief as shown.
3. Plug the power cord into the power supply, then plug the power supply into an outlet. The Green LED on the top cover will light up.

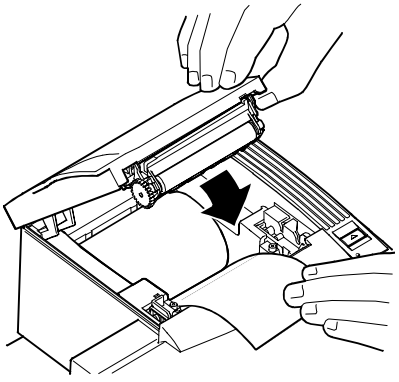
Loading Receipt Paper

1. Tear off the end of the roll so that the edge is loose.
2. Place the roll into the paper bucket with the paper unrolling from the bottom of the roll, and with a few inches of paper extending over the cabinet front.

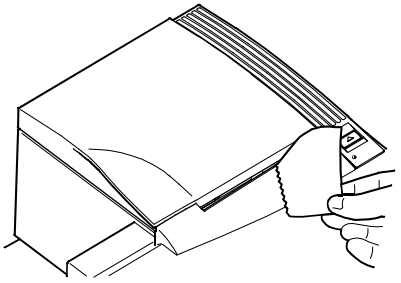
Note: Paper must unroll from the bottom of the roll to insure that the image will print.



3. Close the cover while holding the paper over the front of the cabinet.



4. Remove the excess paper by tearing it against the tear-off blade.



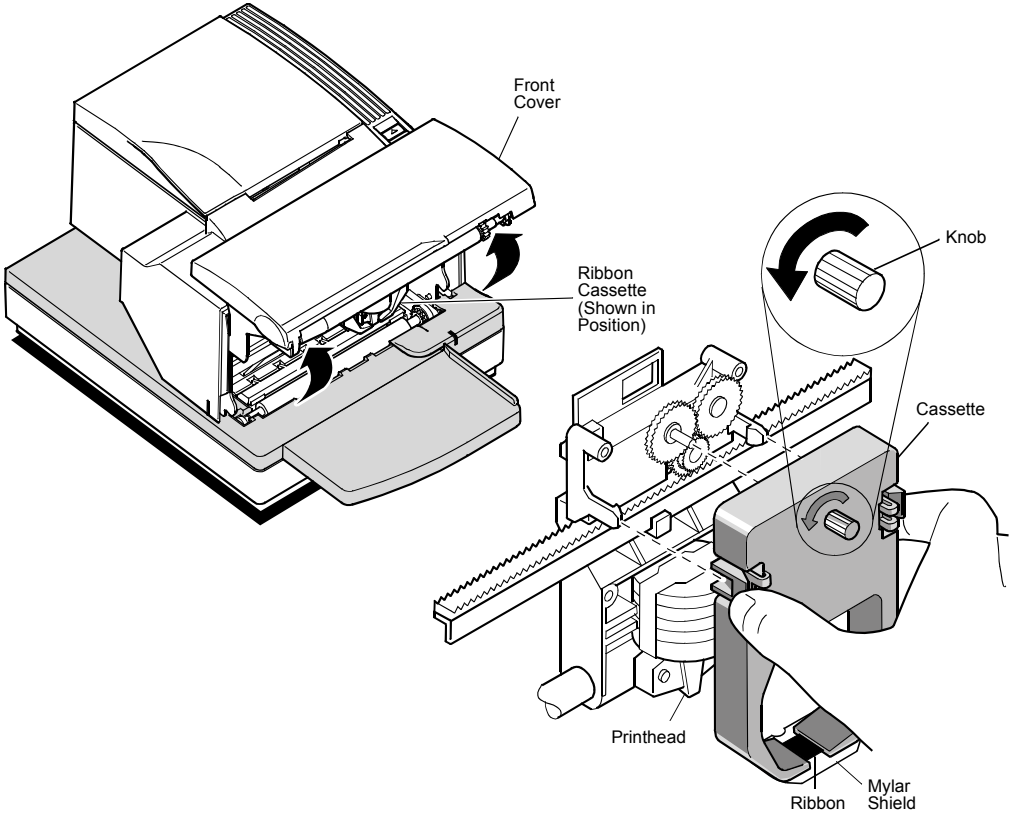
5. Press the Paper Feed Button to advance the paper.

Putting In the Ribbon Cassette

Note: You must use an approved NCR ribbon cassette with the check flip option to prevent jamming or other ribbon problems.

1. Unwrap and tighten the ribbon by turning the knob on the cassette in the direction of the arrow.

Caution: **DO NOT** remove the mylar shield.



2. Open the printer's front cover, position the ribbon cassette onto the carriage, making sure the ribbon is underneath the printhead.
3. Snap the cassette into place and close the front cover.

Testing the Printer

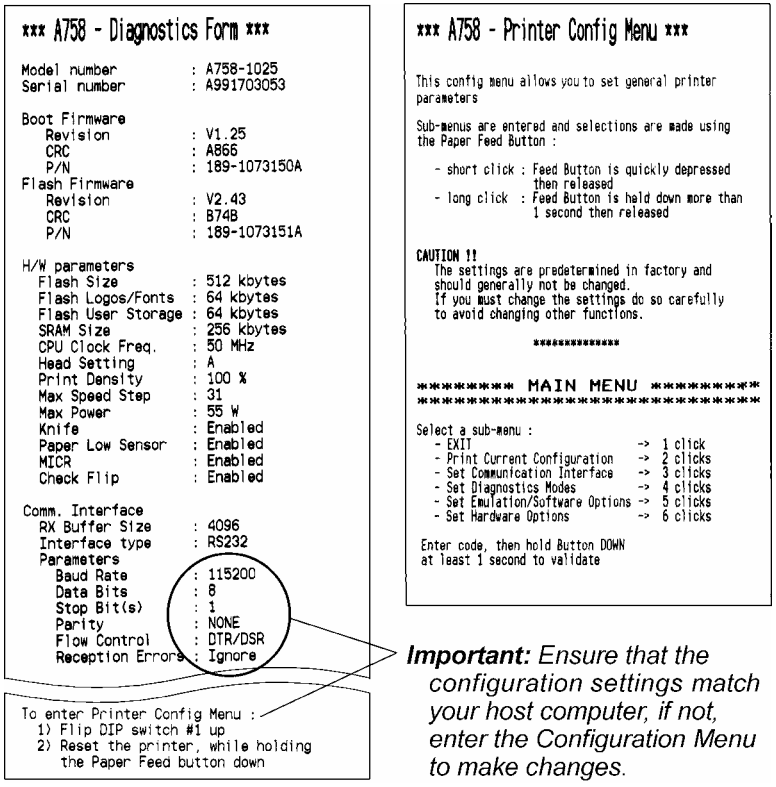
The Configuration Menu allows you to set general printer parameters. The test prints a list of various printer settings and partially cuts the paper if a knife is installed. The test printouts may vary depending on the printer model. To change the default settings, enter the Configuration Menu as instructed on the bottom of the test printout. The printout may be useful to a service representative if there is a problem. If something appears to be wrong with the test printout (such as missing or faded text) additional troubleshooting and diagnostic guides are available.

1. To run the test, either:
   a. Open and close the receipt cover while holding down the Paper Feed Button,

      OR,

   b. Press the Paper Feed Button and the Reset Button at the same time.

2. When the printer begins printing let go of the Paper Feed Button.


*** A758 - Diagnostics Form ***
Model number : A758-1025
Serial number : A991703053
Boot Firmware
Revision : V1.25
CRC : A865
P/N : 189-1073150A
Flash Firmware
Revision : V2.43
CRC : B74B
P/N : 189-1073151A
H/W parameters
Flash Size : 512 kbytes
Flash Logos/Fonts : 64 kbytes
Flash User Storage : 64 kbytes
SRAM Size : 256 kbytes
CPU Clock Freq. : 50 MHz
Head Setting : A
Print Density : 100 %
Max Speed Step : 31
Max Power : 55 W
Knife : Enabled
Paper Low Sensor : Enabled
MICR : Enabled
Check Flip : Enabled
Comm. Interface
RX Buffer Size : 4096
Interface type : RS232
Parameters
Baud Rate : 115200
Data Bits : 8
Stop Bit(s) : 1
Parity : NONE
Flow Control : DTR/DSR
Reception Errors : Ignore
To enter Printer Config Menu :
1) Flip DIP switch #1 up
2) Reset the printer, while holding the Paper Feed button down
*** A758 - Printer Config Menu ***
This config menu allows you to set general printer parameters
Sub-menus are entered and selections are made using the Paper Feed Button :
- short click : Feed Button is quickly depressed then released
- long click : Feed Button is held down more than 1 second then released
CAUTION !!
The settings are predetermined in factory and should generally not be changed.
If you must change the settings do so carefully to avoid changing other functions.
****
********** MAIN MENU **********
Select a sub-menu :
- EXIT -> 1 click
- Print Current Configuration -> 2 clicks
- Set Communication Interface -> 3 clicks
- Set Diagnostics Modes -> 4 clicks
- Set Emulation/Software Options -> 5 clicks
- Set Hardware Options -> 6 clicks
Enter code, then hold Button DOWN at least 1 second to validate

Important: *Ensure that the configuration settings match your host computer, if not, enter the Configuration Menu to make changes.*

Configuration Menu and **Print Test** samples (shown approximately 60% of size).

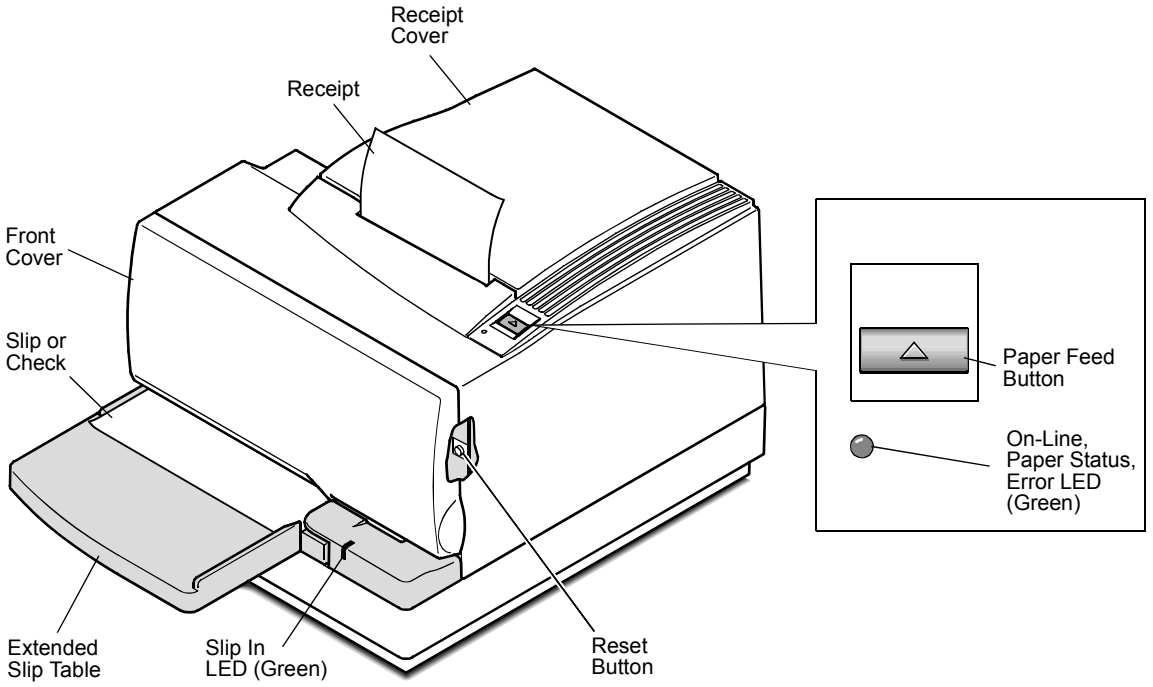
Caution: Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.

3. Press the Paper Feed Button the number of clicks for the printer settings you want.

   Note: Press the Paper Feed Button for at least one second to validate the selection.

Chapter 3: **Using the Printer**

Printer Controls



The printer has the following controls:

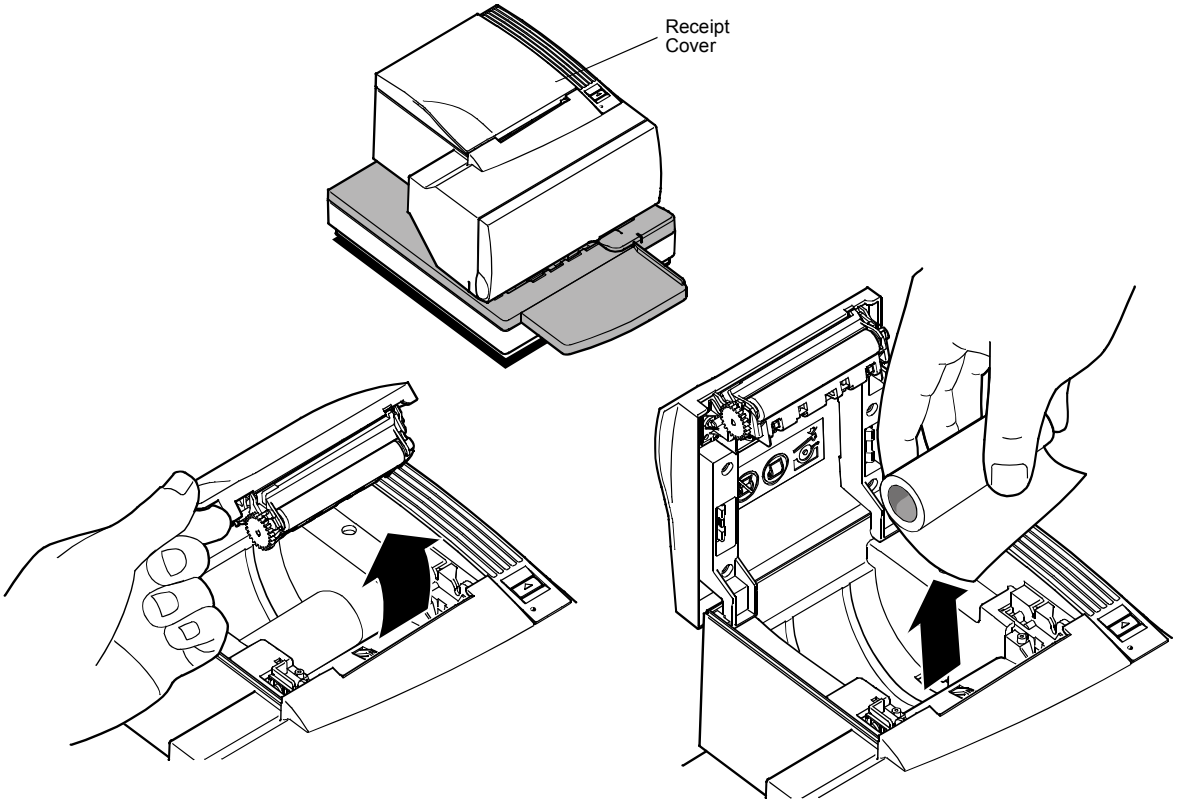
- The Paper Feed Button advances the receipt paper.
- The On Line, Paper Status, Error LED shows the printer status by shining or flashing.
- The Slip-in LED indicates that a form is inserted properly.
- The Reset Button clears the printer's memory or begins special modes.

The printer also indicates its status when it is first turned on, or after it has been reset, by beeping. A single beep indicates the printer has successfully completed its startup routine. But if the printer beeps in a single, double, or triple pattern at first power on, please call your service representative.

Changing the Receipt Paper

Change the paper when either a colored stripe appears on the receipt paper or the printer's On Line, Paper Status, Error LED slowly flashes (indicating that 5 ± 10 feet of paper remains on the roll). Change the paper as soon as possible to avoid running out of paper part way through a transaction.

If the On Line, Paper Status, Error LED blinks fast, the paper is out. Change the paper immediately or data may be lost. The printer will not operate without paper, but it may continue to accept data into memory from the host computer. Because the printer cannot print any transactions, this data in memory may be lost.



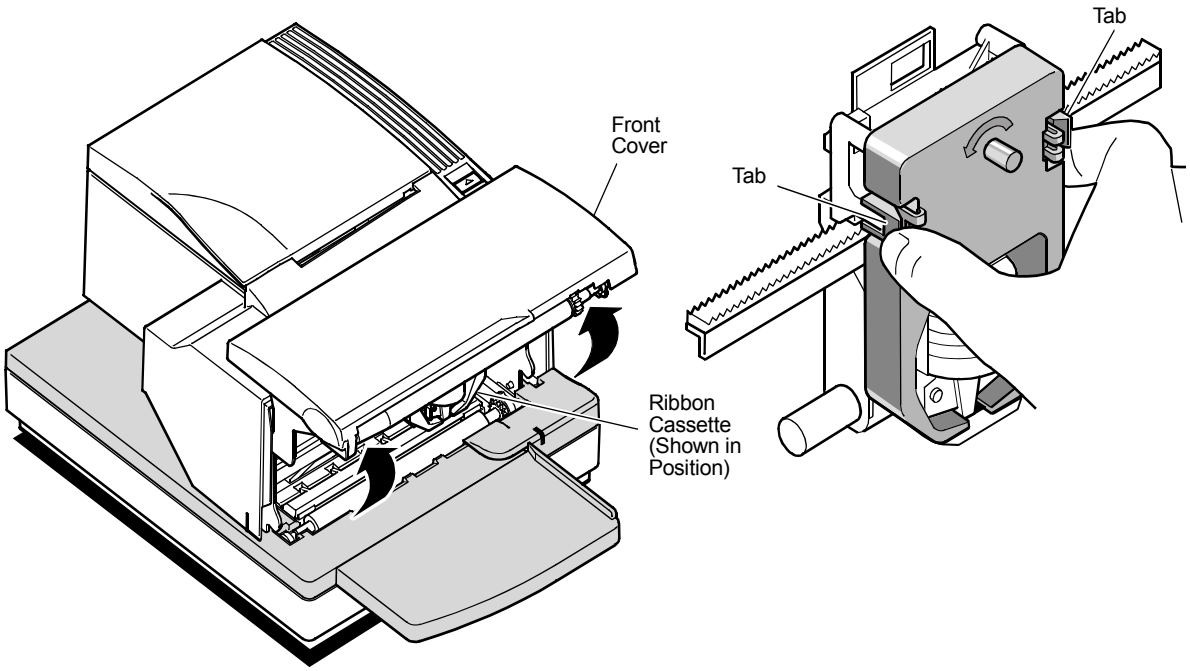
To change the receipt paper:

1. Open the cover and remove the used roll.
2. Tear off the end of the new roll so that the edge is loose.
3. Place the roll into the paper bucket with the paper unrolling from the bottom of the roll, and with a few inches of paper extending over the cabinet front. Paper must unroll from the bottom of the roll to insure the image will print.
4. Close the cover while holding the paper over the front of the cabinet.
5. Remove the excess paper by tearing it against the tear-off blade.
6. Advance the paper if necessary by pressing the Paper Feed Button.

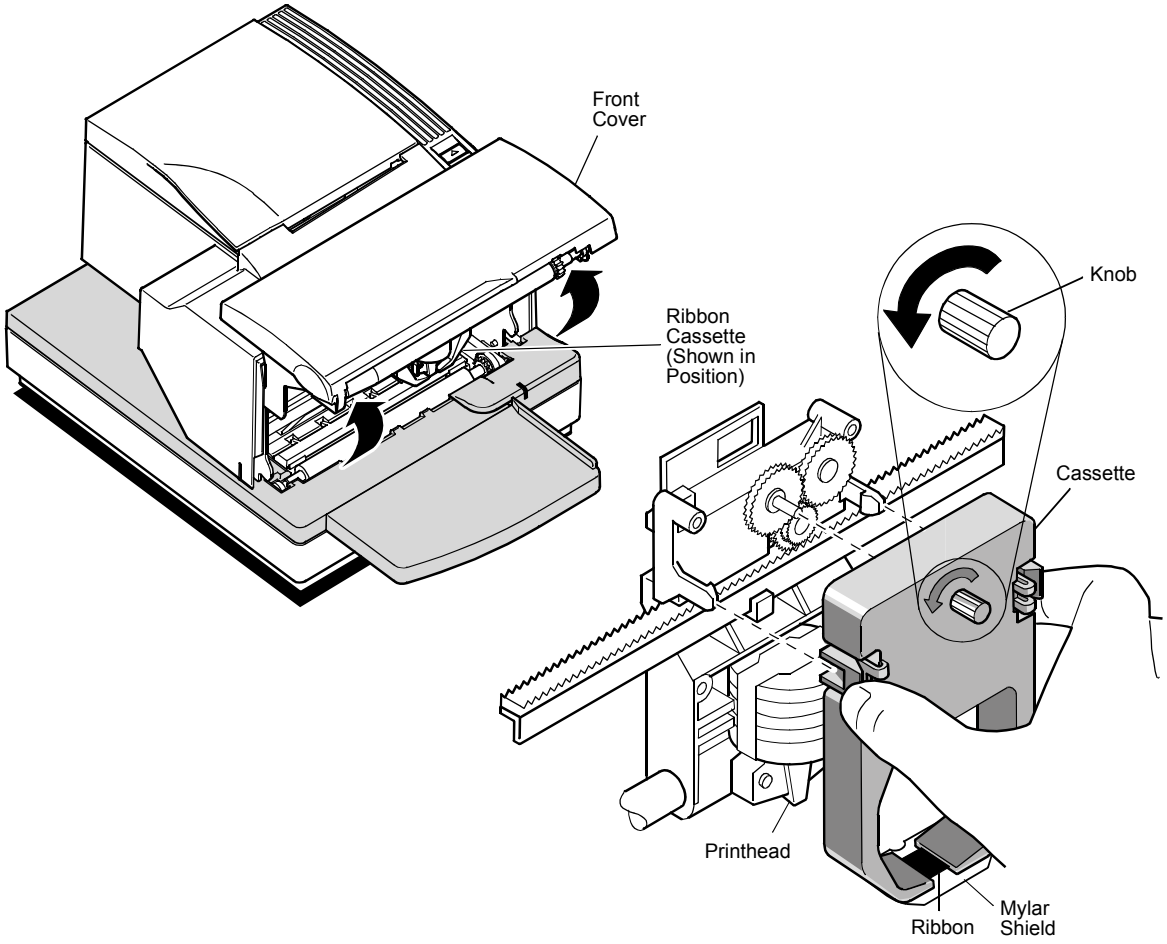
Replacing the Ribbon Cassette

Change the impact printer's ribbon cassette if it is printing lightly.

Note: You must use an approved NCR ribbon cassette with the check flip option to prevent jamming or other printing problems.



1. Open the printer's front cover and pinch the tabs of the old ribbon cassette to remove it.



2. Unwrap and tighten the new ribbon by turning the knob on the cassette in the direction of the arrow.

   Caution: Do not remove the Mylar shield.

3. Position the new ribbon cassette onto the carriage, making sure the ribbon is underneath the printhead.

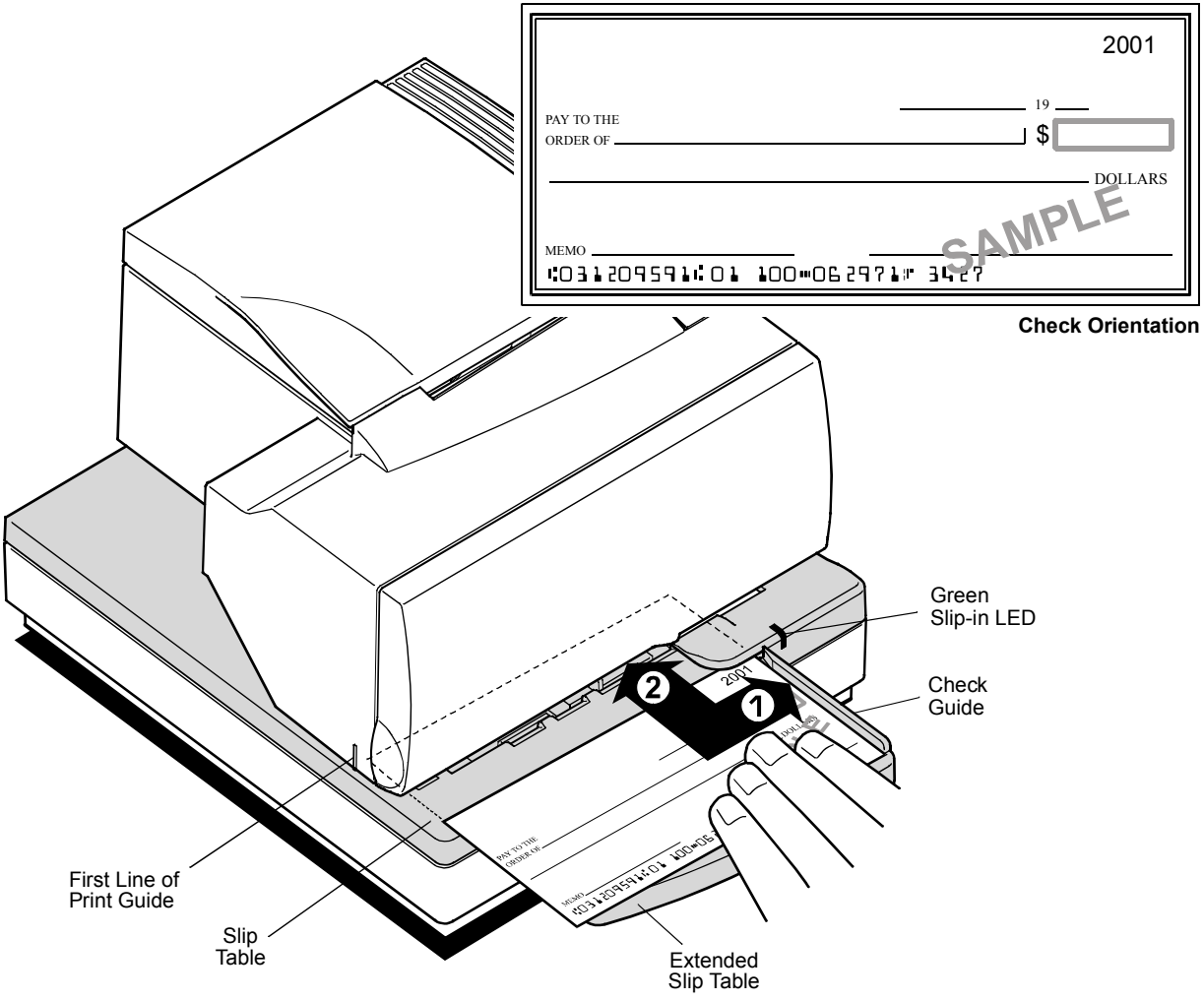
4. Snap the cassette into place and close the front cover.

Printing on Forms or Checks

There are several types of transactions that may require the insertion of a form or check into the printer:

- Credit card transaction
- Multiple-part forms such as credit transactions or merchandise returns
- Electronic funds transfers
- Check printing (printing the date, payee, and amount on the check face)
- Check endorsement

Although the illustration on the following page shows a check being inserted into the printer, these instructions apply to any type of form. The 7158 can print on forms up to five parts thick.



Check Orientation

To print on a form or check:

1. Insert the form or check (check shown in the illustration) from the front and place it on the Slip Table with the print side up. If the form is extra long, you may need to insert it from the side. A slight resistance may be felt when the form comes in contact with the Form Stop.
2. Slide the form or check to the right until it aligns against the Check Guide.
3. Slide a short form or check toward the back of the printer until it contacts the Form Stop (it won't be able to go any further).

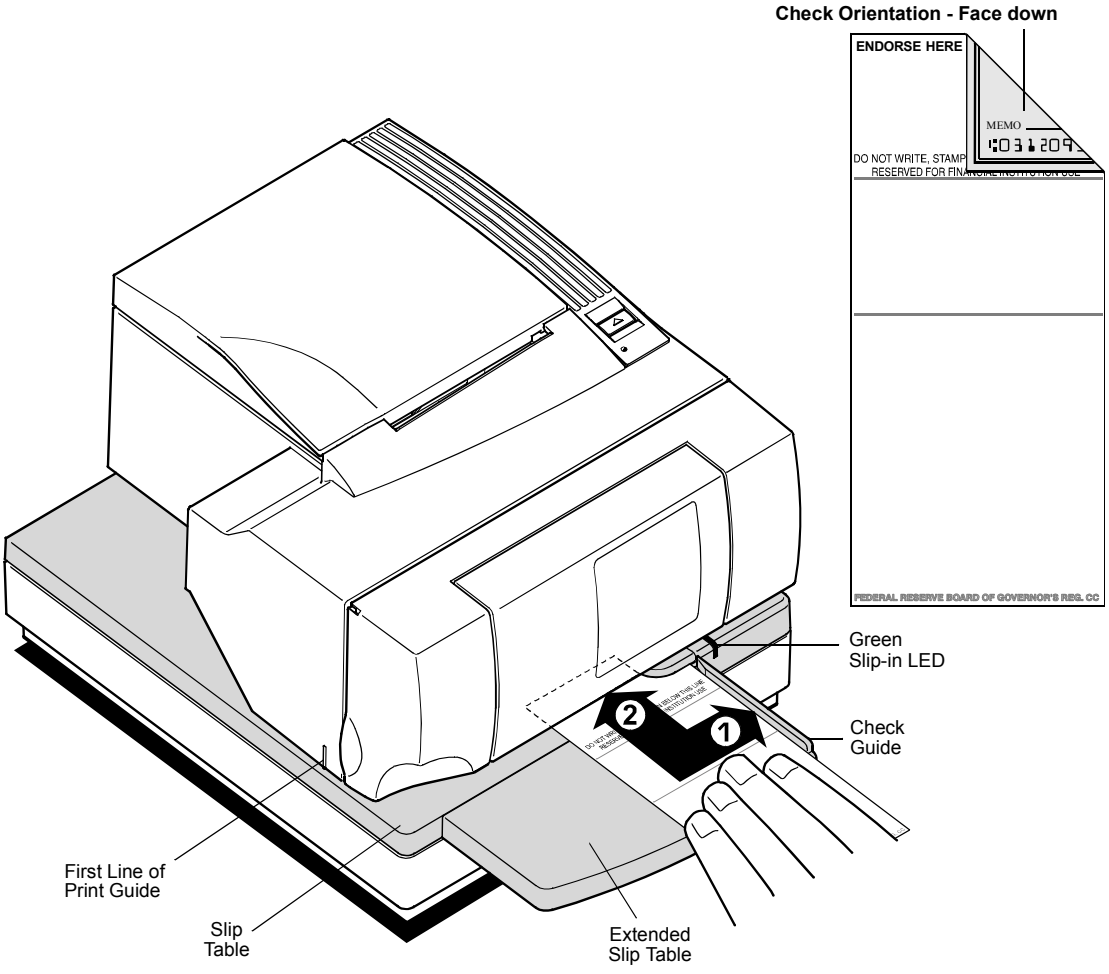
   For a long form, position it appropriately using the First Line of Print Guide.

   The green Slip-in LED on the Slip Table turns on when the form or check is properly inserted (the form has to cover two sensors on the Slip Table).
4. Follow the instructions from the host computer. The printer begins printing.
5. Remove the form or check after it has been fed back out.
6. Follow the instructions from the host computer to finish the transaction.

Verifying and Validating Checks

If the printer has the optional MICR check reader, checks are verified and then validated. If the printer also has the optional check flip feature, the printer is able to flip the check over and print on the front of the check.

Note: To ensure that checks are properly verified and validated, they must be free of folds and wrinkles and inserted correctly into the MICR printer. Smooth a wrinkled or folded check for best performance.



To verify and validate a check:

2. Place the check, face down on the Slip Table, with the bottom edge of the check to the right. Move the check to the right until it aligns against the Check Guide.
3. Slide the check straightforward into the printer until it stops. The green Slip-in LED on the front of the printer comes on.

Note: IMPORTANT: Hold the check to the right, against the Check Guide and release it as soon as the printer begins to run.

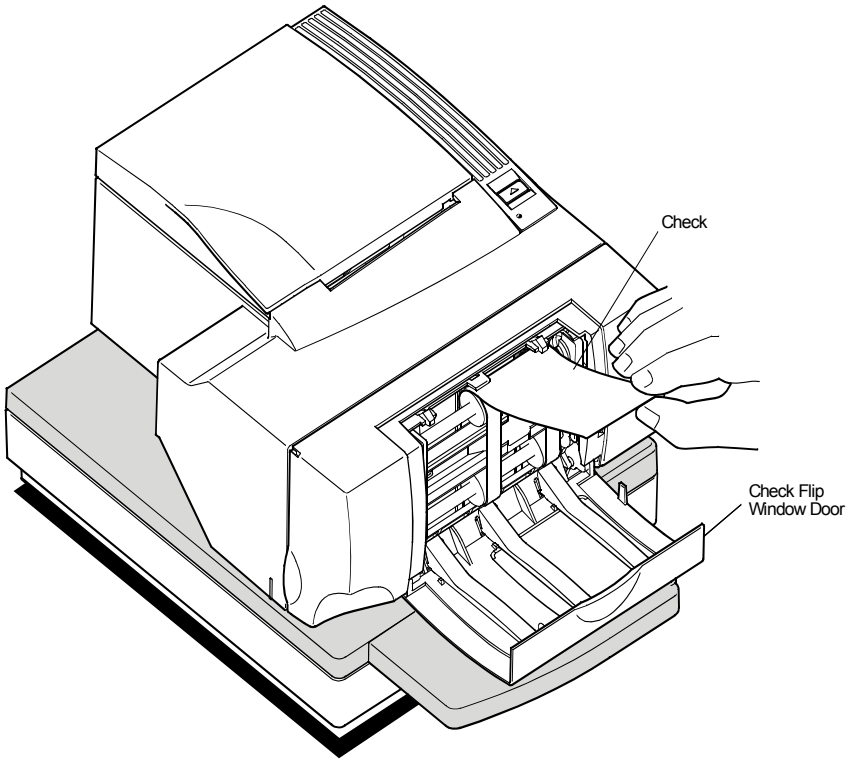
4. Follow the instructions on the host computer to complete the MICR process:
   a. When instructed by the host, the check is fed into the printer, read and backed out to a position ready for endorsement, if desired.
   b. With the optional check-flip feature, the check is fed into the printer, verified, fed up into the check flip mechanism, flipped, fed back into the printer, printed on the front and released.

Note: If the terminal indicates an incorrect read of the MICR:

- Remove the check.
- Reinsert the check, ensuring instructions 1 through 3 above are followed.

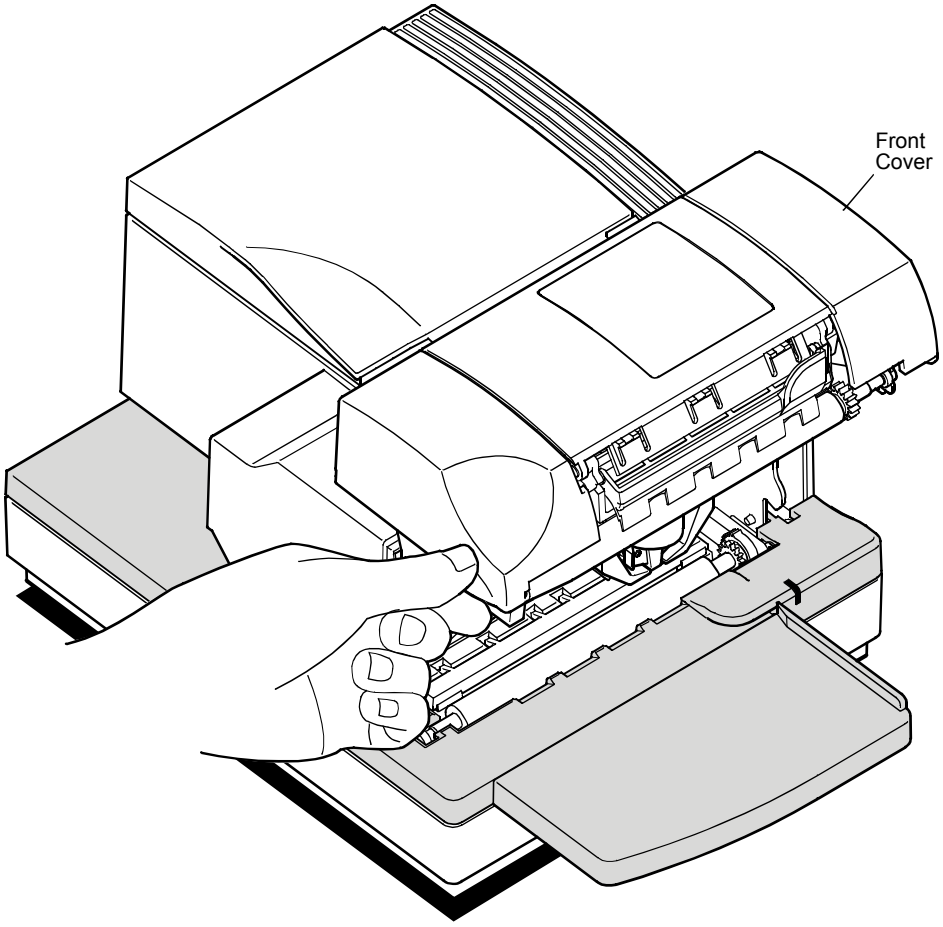
5. Only remove the check when it is fully released by the printer.
6. Continue to follow the instructions from the host computer to finish the transaction.

Clearing Check Flip Paper Jams



To clear a paper jam from the optional check flip assembly:

1. Look in the window of the check flip assembly. If the jammed check is visible, open the window and remove it.



2. If the jammed check is not visible in the window, open the Front Cover and remove the jammed check from behind the check flip assembly.

Testing the Printer

The Configuration Menu allows you to set general printer parameters. The test prints a list of various printer settings and partially cuts the paper if a knife is installed. The test printouts may vary depending on the printer model. The printout may be useful to a service representative if there is a problem. To change the default settings, enter the Configuration Menu as instructed on the bottom of the test printout. If something appears to be wrong with the test printout (such as missing or faded text), see the troubleshooting section in this document.

1. To run the test, either:
   a. Open and close the receipt cover while holding down the Paper Feed Button.

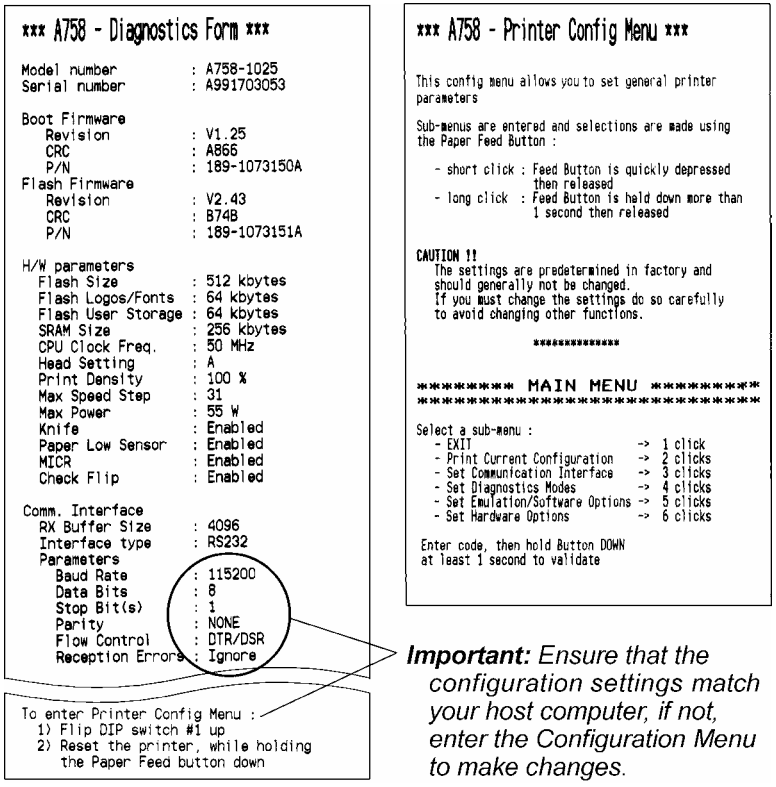
      OR

   b. Press the Paper Feed Button and the Reset Button at the same time.
2. When the printer begins printing let go of the Paper Feed Button.

Caution: Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.

Press the Paper Feed Button the number of clicks for the printer settings you want.

Note: Press the Paper Feed Button for at least one second to validate the selection.


*** A758 - Diagnostics Form ***
Model number : A758-1025
Serial number : A991703053
Boot Firmware
Revision : V1.25
CRC : A865
P/N : 189-1073150A
Flash Firmware
Revision : V2.43
CRC : B74B
P/N : 189-1073151A
H/W parameters
Flash Size : 512 kbytes
Flash Logos/Fonts : 64 kbytes
Flash User Storage : 64 kbytes
SRAM Size : 256 kbytes
CPU Clock Freq. : 50 MHz
Head Setting : A
Print Density : 100 %
Max Speed Step : 31
Max Power : 55 W
Knife : Enabled
Paper Low Sensor : Enabled
MICR : Enabled
Check Flip : Enabled
Comm. Interface
RX Buffer Size : 4096
Interface type : RS232
Parameters
Baud Rate : 115200
Data Bits : 8
Stop Bit(s) : 1
Parity : NONE
Flow Control : DTR/DSR
Reception Errors : Ignore
To enter Printer Config Menu :
1) Flip DIP switch #1 up
2) Reset the printer, while holding
the Paper Feed button down
*** A758 - Printer Config Menu ***
This config menu allows you to set general printer parameters
Sub-menus are entered and selections are made using the Paper Feed Button :
- short click : Feed Button is quickly depressed then released
- long click : Feed Button is held down more than 1 second then released
CAUTION !!
The settings are predetermined in factory and should generally not be changed.
If you must change the settings do so carefully to avoid changing other functions.
****
********** MAIN MENU **********
Select a sub-menu :
- EXIT -> 1 click
- Print Current Configuration -> 2 clicks
- Set Communication Interface -> 3 clicks
- Set Diagnostics Modes -> 4 clicks
- Set Emulation/Software Options -> 5 clicks
- Set Hardware Options -> 6 clicks
Enter code, then hold Button DOWN
at least 1 second to validate

Important: *Ensure that the configuration settings match your host computer, if not, enter the Configuration Menu to make changes.*

Configuration Menu and **Print Test** samples (show approximately 60% of size).

Printer Configuration

Printers are generally shipped with all appropriate configuration settings pre-set at the factory. The only time the user should need to change the printer configuration is if a new option is installed or the firmware is changed. It is also possible the user may need to run certain tests using the Configuration Menu.

The user configures the printer using a convenient Configuration Menu that is printed on receipt paper. The Configuration Menu prints instructions and setting options interactively as the user goes through the configuration process. The following functions and parameters can be changed with the scrolling Configuration Menu:

- Communication Interface

  Interface Type
  Baud Rate
  Number of Data Bits
  Number of Stop Bits
  Parity
  Hardware (DTR/DSR) or Software (XON/XOFF) Flow Control
  Data Reception Errors

- Diagnostic Modes

  Normal Mode
  Datascope Mode
  Receipt Test Mode
  Slip Test Mode
  MICR Test Mode
  Check Flip Test Mode

- Emulations/Software Options

  Printer Emulations
  Printer ID Mode
  Default Lines Per Inch
  Carriage Return Usage
  Alternate Commands

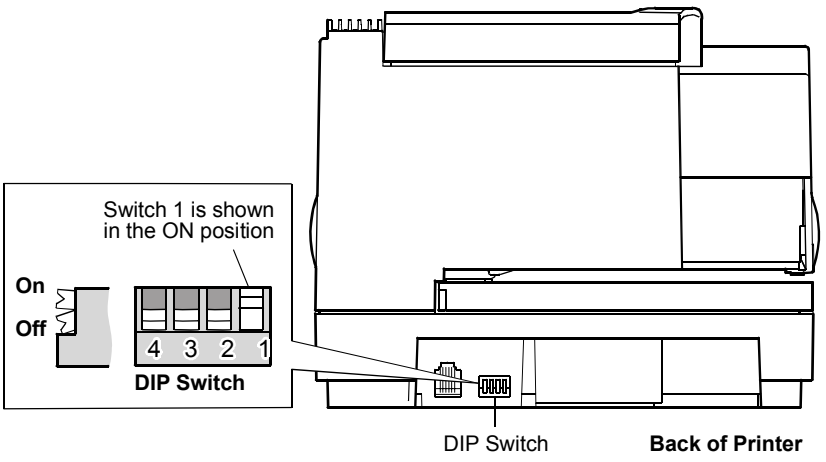
- Hardware Options

  Print Density
  Maximum Power
  Knife Options
  Paper Low Sensor
  Printhead Resistance
  MICR Option
  Check Flip Option

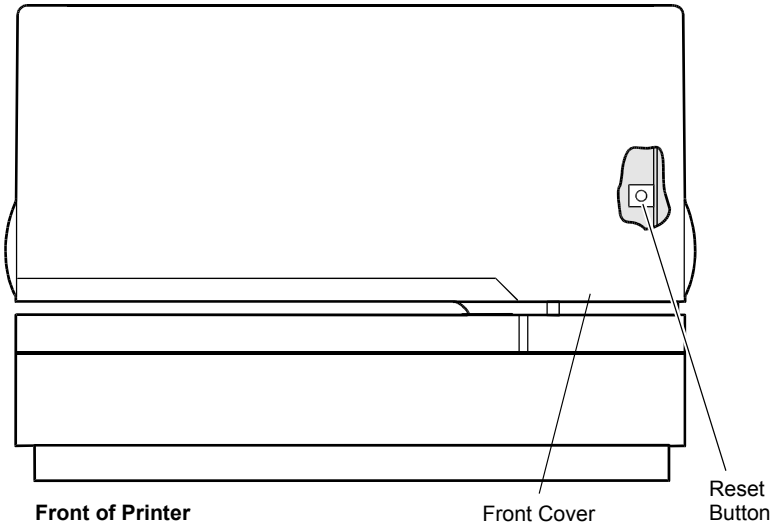
Configuring the Printer

Use the Configuration Menu to select functions or change various settings as indicated in the preceding sections. The Configuration Menu prints instructions and setting options interactively as the user goes through the configuration process.

Caution: Be extremely careful changing any of the printer settings to avoid inadvertently changing other settings that might affect the performance of the printer.

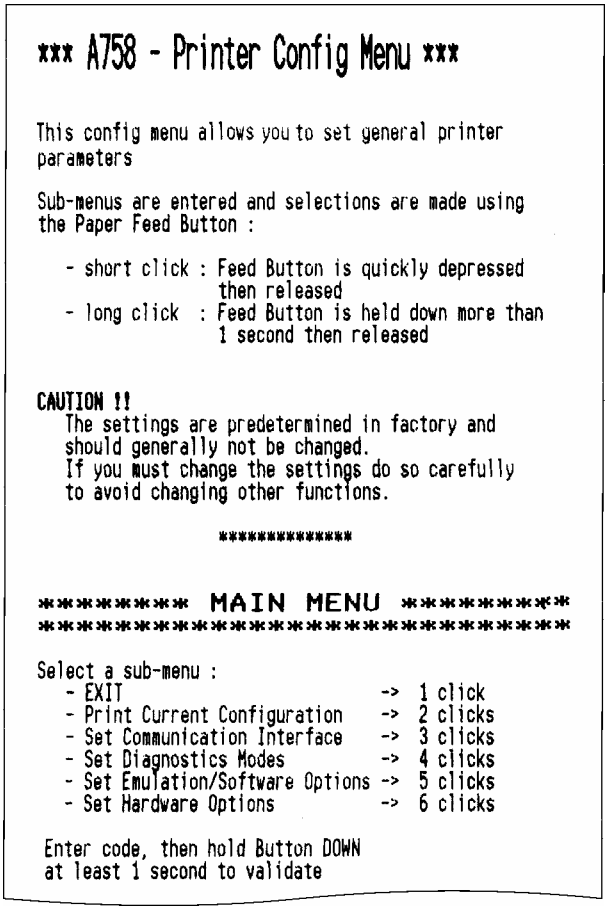


1. Set DIP Switch 1 to On.



2. Press the Reset Button while holding the Paper Feed Button.

   The printer beeps, prints the current configuration, then prints the first SELECTION.



```
*** A758 - Printer Config Menu ***

This config menu allows you to set general printer
parameters

Sub-menus are entered and selections are made using
the Paper Feed Button :

   - short click : Feed Button is quickly depressed
                   then released
   - long click  : Feed Button is held down more than
                   1 second then released


CAUTION !!
   The settings are predetermined in factory and
   should generally not be changed.
   If you must change the settings do so carefully
   to avoid changing other functions.

                  **************


********** MAIN MENU **********
**********************************

Select a sub-menu :
   - EXIT                          ->  1 click
   - Print Current Configuration   ->  2 clicks
   - Set Communication Interface   ->  3 clicks
   - Set Diagnostics Modes         ->  4 clicks
   - Set Emulation/Software Options ->  5 clicks
   - Set Hardware Options          ->  6 clicks

 Enter code, then hold Button DOWN
 at least 1 second to validate
```

3. Follow all the instructions on the scrolling menu.

4. Press the Paper Feed Button to make the selections.
   The instructions indicate whether to select something with a short click, a long click, or a series of short clicks. Indicate Yes with a long click, No with a short click. Press and hold the Paper Feed Button for at least one second for a long click. Press the Paper Feed Button quickly for a short click.

5. When finished, set DIP Switch 1 to Off and reset printer.
6. Press the Reset Button. The printer resets with the new selections.

Communication Interface

The Configuration Menu gives the user the option of setting the printer to use an RS-232C serial port. (See "Configuring the Printer" for instructions on how to enter the Configuration Menu.)

RS-232C Serial Interface Settings

If the user sets the printer to use an RS-232C serial interface, the Configuration Menu can be used to set the following RS-232C-specific settings:

- Set a baud rate of 115200, 57600, 38400, 19200, 9600, 4800, 2400, or 1200 baud
- Set the number of data bits to seven or eight
- Set the number of stop bits to one or two
- Enable or disable parity
- Set flow control to software (XON/XOFF) or Hardware (DTR/DSR)
- Set the printer to ignore data errors or print a "?" upon encountering an error

The settings used will depend on the software the operator is using and the capabilities of the host computer.

Diagnostic Modes

This function allows the user to put the printer into the following diagnostic modes:

- **Normal Mode:** this is the normal operating mode of the printer.
- **Datascope Mode:** the receipt printer prints incoming commands and data in hexadecimal format.
- **Receipt Test Mode:** the receipt printer prints two code pages.
- **Slip Test Mode:** the slip printer prints two code pages.
- **MICR Test Mode:** the receipt printer prints all characters recognized by the MICR.
- **Check Flip Test Mode:** the check flip mechanism will flip an inserted check.

These diagnostic modes are enabled or disabled by using the Configuration Menu. See "Configuring the Printer," for instructions on how to enter the Configuration Menu.

Datascope Mode

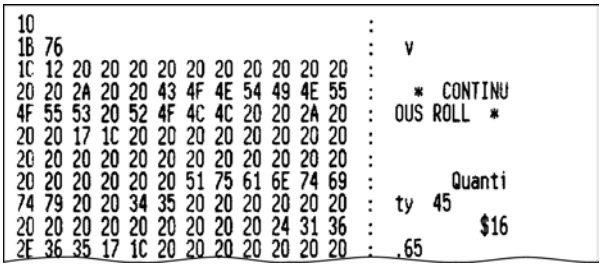
Datascope Mode allows the user to test the printer's communications. When in Datascope Mode the printer receives all communications, but instead of executing the commands it prints them out on receipt paper as hexadecimal numbers in the order received. For example, the ASCII character "A" is printed as the hexadecimal number 41 and so on.

To run the Datascope Mode:

1. Enter the Configuration Menu. See "Configuring the Printer for instruction on how to enter the Configuration Menu.
2. After you have enabled the Datascope Mode through the Configuration Menu, exit the Configuration Menu.

3. Run a transaction from the host computer.

   All commands and data sent from the host computer will be printed as hexadecimal numbers as shown in the illustration.



To exit the Datascope Mode:

1. 1. Enter the Configuration Menu again.
2. Disable the Datascope Mode.
3. Exit the Configuration Menu.

   The printer is in Normal Mode and can communicate with the host computer.

Receipt Test Mode

To run the Receipt Test Mode:

1. Enable the Receipt Test Mode through the Configuration Menu. See "Configuring the Printer," for instructions on how to enter the Configuration Menu.
2. Push Paper Feed Button and the receipt station will print two code pages.
3. The test ends with a cut.
4. Go to step 2 again to repeat this test.

To exit the Receipt Test Mode:

5. Enter the Configuration Menu again.
6. Disable the Receipt Test Mode.

7. Exit the Configuration Menu.

   The printer is in Normal Mode and can communicate with the host computer.

Slip Test Mode

To run the Slip Test Mode:

1. Enable the Slip Test Mode through the Configuration Menu, (See "Configuring the Printer," for instructions on how to enter the Configuration Menu). Then exit the Configuration Menu.
2. Insert a slip into the slip station.
3. Push the Paper Feed Button.
4. Two code pages will be printed.
5. Go to step 2 again to repeat this test.

To exit the Slip Test Mode:

6. Enter the Configuration Menu again.
7. Disable the Slip Test Mode.
8. Exit the Configuration Menu.

   The printer is in Normal Mode and can communicate with the host computer.

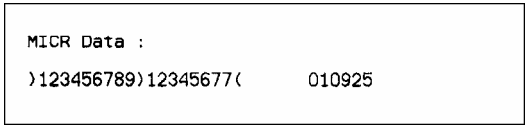
MICR Test Mode

MICR Test Mode allows the user to test whether the MICR is operating correctly. When the printer is in this mode the MICR reads the characters on a check as usual, but instead of transmitting the values to the software it prints them on receipt paper.

To run the MICR Test Mode:

1. Enter the Configuration Menu. See "Configuring the Printer," for instructions on how to enter the Configuration Menu.

2. After enabling the MICR Test Mode through the Configuration Menu, exit the Configuration Menu.
3. Insert a check into the slip station. (See "Verifying and Validating Checks" section.)
4. The printer waits until a check is inserted and detected before the platen closes and the characters are read by the MICR check reader. The decoded data is printed on receipt paper, the platen is opened, and the test is re-started.
5. The printed numbers should match the numbers on the check. If the MICR check reader misreads a character, the test prints a question mark "?". If the MICR check reader is unable to read any characters, the test prints "NO MICR CHARACTERS."



To exit the MICR Test Mode:

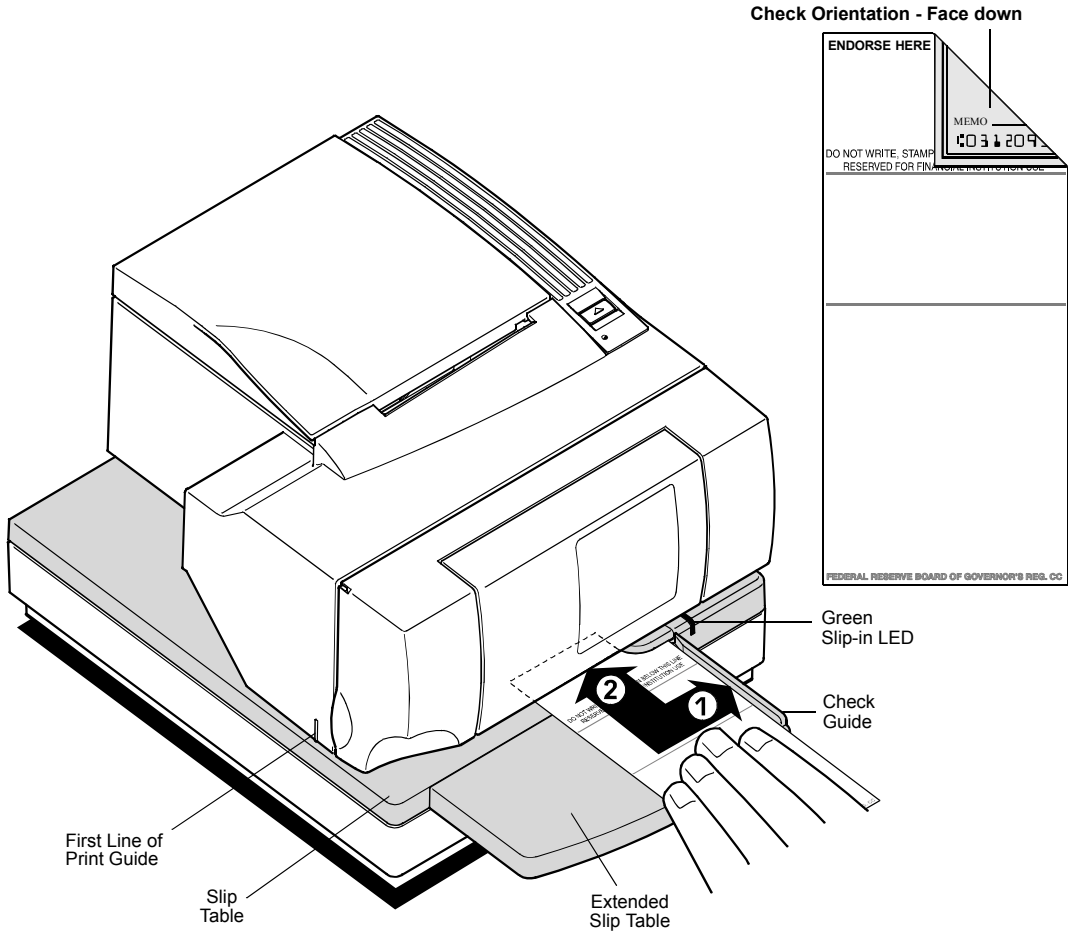
6. Enter the Configuration Menu again.
7. Disable the MICR Test Mode.
8. Exit the Configuration Menu.

   The printer is in Normal Mode and can communicate with the host computer.

Check Flip Test Mode

To run the Check Flip Test Mode:

1. Enable the Check Flip Test Mode through the Configuration Menu (See "Configuring the Printer," for instructions on how to enter the Configuration Menu), then exit the Configuration Menu.
2. Insert a check as if validating the check, lengthwise and face down into the slip station. (See "Verifying and Validating Checks" section to insert check.)
   A check must be used—if any other slip or form is inserted the printer will not conduct the test.



3. Push Paper Feed Button.

The check then goes through the flip routine only—no printing takes place.

To exit the Check Flip Test Mode:

4. Enter the Configuration Menu again.
5. Disable the Check Flip Test Mode.
6. Exit the Configuration Menu.

   The printer is in Normal Mode and can communicate with the host computer.

Emulation/Software Options

Printer Emulations

Printer emulations determine the commands that are available to the printer. They are set by using the Configuration Menu. (See "Configuring the Printer" for instructions on how to enter the Configuration Menu.) The available options are:

- 7158 Native (enables all new functions)
- 7156 Emulation (for use with legacy software)

Printer ID Mode

This switch is used to determine what Printer ID value is returned in response to a Transmit Printer ID (1D 49 01) when the printer is in 7156 Emulation Mode. The printer can be configured to send back the ID of the 7158 or the 7156.

Default Lines Per Inch

This function allows the user to set the default lines per inch printed by the thermal receipt printer to 6, 7.52 or 8.13. (See "Configuring the Printer" for instructions on how to enter the Configuration Menu to change this setting.)

Carriage Return Usage

This function allows the printer to ignore or use the Carriage Return (hexadecimal 0D) command depending on the application. Some applications expect the command to be ignored while others use the command as a print command. (See "Configuring the Printer" for instructions on how to enter the Configuration Menu to change this setting.)

Hardware Options

Print Density

This function makes it possible to adjust the energy level of the printhead to darken the printout. An adjustment should only be made when necessary. The factory setting is 100%.

Warning: Choose an energy level no higher than necessary to achieve a dark printout.

Failure to observe this rule may result in a printer service call or voiding of the printer warranty. Consult your NCR technical support specialist if you have any questions.

Maximum Power

This function makes it possible to match the printer to the wattage of the power supply. The 55 W power supply is standard, whereas the 75 W power supply enables the printer to optimize speed at higher dot coverage. (See "Configuring the Printer" for instructions on how to enter the Configuration Menu to change this setting.)

Knife Option

This function makes it possible to set the Knife Option if it is installed in the printer. This setting should only be changed if the option is added or removed.

Paper Low Sensor

Paper Low Sensor setting makes it possible to enable or disable the paper low sensor for particular printer configurations.

Printhead Resistance

The printhead in the thermal receipt printer can be one of two types. The printhead resistance setting must match the character (A or B) stamped on the heatsink in the back of the printhead. This character is visible by removing the top cover of the printer. Only a trained service representative may remove this cover. Therefore, under normal use this setting should be left at the factory default.

Using the Configuration Menu sets the printhead resistance settings. See "Configuring the Printer" for instructions on how to enter the Configuration Menu.

MICR Option

This function makes it possible to set the MICR Option if it is installed in the printer. This setting should only be changed if the option is added or removed.

Check Flip Option

This function makes it possible to set the Check Flip Option if it is installed in the printer. This setting should only be changed if the option is added or removed.

Basic Troubleshooting

The 7158 printer is a simple, generally trouble-free printer, but from time to time minor problems may occur. For example, the power supply may be disconnected or the thermal printhead may overheat.

The On Line, Paper Status, Error LED on the operator panel may signal that something is wrong. The light on the front right side of the printer is used only to indicate when a form is inserted properly. It does not indicate an error.

For some problems, the printer communicates the information to the host computer and relies on the application to indicate what the problem is.

The information on the following pages describes some problems that you may encounter: problems that you can easily fix, and others that you will need to contact a service representative for.

You may be able to correct many of the conditions or problems without calling for service. However, if a problem persists, contact a service representative. See "Contacting a Service Representative" at the end of this chapter.

If something is wrong with the printer, take the following general steps:

- Cycle the power of the printer and note its behavior.
- Check the On Line, Paper Status, Error LED and compare its behavior to the table below.

Status	LED Behavior
Power Off	Off
Firmware Download	Fast Blink
Level 0 Diagnostics (entered at power on or in reset)	Fast Blink
Paper Low Temperature Error Voltage Error	Slow Blink
Cover Open (receipt, slip or flip) Paper Out Carriage Jam Slip Jam Flip Jam Knife Jam	Fast Blink
All other states	On

- Test the receipt printer or slip printer by printing a sample test print as described elsewhere in this document.
- Determine if the problem is with the thermal receipt printer or the impact slip printer and refer to the tables on the following pages.

Printer Beeps

Problem/Symptom	Possible Causes	What to Do
Printer beeps in a single, double, or triple pattern at first power on, the On Line, Paper Status, Error LED blinks in the same pattern, and the printer won't power up.	The printer has a problem with its electronics.	Contact a service representative.
Printer beeps during normal operation.	The printer may be programmed to beep during normal operation by the software application used on the host computer.	Consult your application software manual.

Printer Will Not Print

Problem/Symptom	Possible Causes	What to Do
The On Line, Paper Status, Error LED is blinking and the printer won't print.	The receipt paper may be out, the cover open, the knife jammed, the supply voltage out of range, or the printhead temperature out of range.	Check that the receipt paper is properly loaded and covers are closed. See the table at the beginning of this section. For problems not user correctable, contact a service representative.
Printer doesn't have power (LED not on)	Power supply may be defective.	If the power supply is plugged in, but does not come on, you will need to order a new power supply. See "Media and Supplies" in this document.
Printer has power but doesn't print.	Cables may not be connected properly.	Check all cable connections. Check that the host computer and power supply are both on (the power supply is turned on by plugging it into an outlet). See "Connecting the Cables" in this document.
	DIP Switches not set correctly.	Check the switch setting. DIP Switch one should be off (down) for normal operation.
	All other causes.	Contact a service representative.

On-Line, Paper Status, Error LED Flashes

Problem/Symptom	Possible Causes	What to Do
On Line, Paper Status, Error LED is blinking.	Receipt paper is out. Change the paper now. Do not run a transaction without paper as the data may be lost.	Change the paper immediately. See "Loading and Changing the Receipt Paper" in the *Owner's Guide*.
	Receipt, front or flip cover is open.	Close the cover. The printer will not operate with any of the covers open.
	The knife is jammed.	Open the receipt cover and check the knife. Clear any jammed paper you can see. Tear off any excess paper against the tear-off blade.
	The slip is jammed.	Open the Front Cover and clear paper from path.
	The carriage is jammed.	Open Front Cover and clear paper from path.
	A jam during flip.	If visible through Front Window, open access door and clear paper jam, if not, open Front Cover and clear jam.
	Receipt paper is low.	There are about 4.5 meters, ± 3 meters, (15 feet, ± 10 feet) of paper left. Change the paper soon to avoid running out of paper part way through a transaction. See "Loading and Changing the Receipt Paper" in this document.
	AC supply voltage is out of range.	If paper is not low and no conditions indicate that the thermal printhead is too hot, then it is likely that the power supply voltage is out of range. Contact a service representative.
On Line, Paper Status, Error LED is blinking.	Thermal printhead temperature is out of range.	The printhead may overheat when printing in a room where the temperature is above the recommended operating temperature or when printing high density graphics continuously, regardless of the room temperature. In either case, the printer will shut off. If the temperature of the printhead is too hot, adjust the room temperature or move the printer to a cooler location. If the printhead is overheating because of printing high density graphics continuously, reduce the demand on the printer.

Poor Forms Print Quality

Problem/Symptom	Possible Causes	What to Do
Printer starts to print, but stops while the form is being printed.	Communication error or software error.	Check the interface cable. Check that the software is working properly.
Forms print is light or spotty.	Form not inserted incorrectly.	See "Printing on Forms or Checks" in this document.
	Impact printhead is dirty or defective.	Contact a service representative.
	Improper internal cable connections.	Contact a service representative.
Ribbon cassette is worn.	Replace the ribbon cassette.	See "Replacing the Ribbon Cassette" in this document.
Light print, smudging, or slip skews.	Platen gap needs adjustment.	Contact a service representative.

Poor Receipt Print Quality

Problem/Symptom	Possible Causes	What to Do
Colored stripe on receipt.	Paper is low.	Change the paper.
Receipt does not come out all the way.	Paper is jammed.	Open the receipt cover, inspect the knife, and clear any jammed paper.
Printer starts to print, but stops while the receipt is being printed.	Paper is jammed.	Open the receipt cover, inspect the knife, and clear any jammed paper.
Print is light or spotty.	Paper roll loaded incorrectly.	Check that the paper is loaded properly.

	Thermal printhead is dirty.	Use recommended thermal receipt paper. Clean the thermal printhead with an alcohol pen. Do not spray the thermal printhead with household cleaner as this may damage it and the electronics. The thermal printhead does not normally require cleaning if the recommended paper grades are used. If non-recommended paper has been used for an extended period of time, cleaning the printhead with an alcohol pen will not be of much benefit.
		Contact a service representative.
	Improper internal cable connections.	Contact a service representative.
	Printhead is defective.	
Vertical column of print is missing, one side of receipt is missing, or top or bottom half of characters are missing.	Printhead is defective.	Contact a service representative.
Print cassette ribbon jams when check flip option is used.	Improper ribbon cassette. An approved NCR cassette must be used with the check flip option.	Replace cassette with a cassette approved for the check flip option.

Slip Station, MICR and Flip Problems

Problem/Symptom	Possible Causes	What to Do
Slip Table LED does not come on.	Form or check not inserted properly.	Line up the form or check against the Check Guide (wall) and slide it toward the back of the printer until it contacts the Form Stop and can't go any further. Extra long forms may need to be inserted from the side to disengage the Form Stop. See "Printing on Forms or Checks" or "Validating and Verifying Checks" in this document.
Forms or checks skew or catch in the slip station.	There is an obstruction or paper jam in the slip station.	Open the front cover and check for any paper jams or obvious obstruction in the slip station. Clear the obstruction or jammed paper.
The optional check flip mechanism doesn't work.	There is an obstruction or paper jam in the check flip mechanism.	See "Clearing Paper Jams" in this document.
The optional MICR (Magnetic Ink Character Recognition) check reader does not read or misreads checks.	The check is inserted improperly.	Make sure the check is inserted properly with the MICR characters down. See "Validating and Verifying Checks" in the *Owner's Guide*.
	The check is fraudulent.	Make sure that the check is not fraudulent. On fraudulent checks, the characters the printer reads may be different from those that are visible on the check face.
	A nearby magnetic source is interfering with the check reader.	Devices, such as CRT monitors, security devices or large metal surfaces that are near the printer can affect the printer's magnetic field, causing intermittent reading errors when the MICR check reader is in operation. Move the printer away from such items or areas.
Print cassette ribbon jams when check flip options is used.	Improper ribbon cassette. Approved NCR cassette must be used with the check flip option.	Replace cassette with a cassette approved for the check flip option.

Knife Does Not Operate

Problem/Symptom	Possible Causes	What To Do
Receipt is not cut.	Paper is jammed.	Open the receipt cover, inspect the knife, and clear any jammed paper.
	The printer has a knife but the firmware is not configured for a knife.	Enable the knife option by reconfiguring the printer. See "Configuring the Printer" in this document.
	All other problems.	Contact a service representative.

Other Serious Problems

The following problems all need to be corrected by a qualified service representative. See the next section, "Contacting a Service Representative."

- MICR check reader not operating properly
- Forms not feeding into the slip/forms area properly
- Missing dots in slip or forms printing
- Printer will not cycle or stop when required
- Illegible characters
- Paper will not feed
- Knife will not cycle or cut
- Platen will not open or close
- Printer will not communicate with the host computer

Contacting a Service Representative

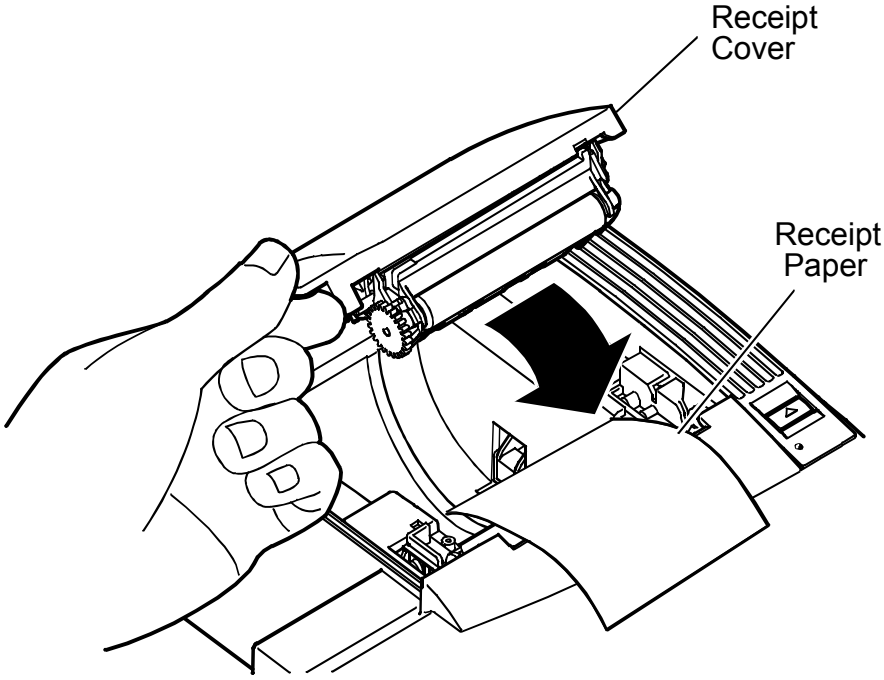
For serious problems, such as the printer not printing, not communicating
with the host computer, or not turning on, contact NCR technical support.

For self-maintenance organizations, a service guide, service video, parts manual, and other service documents, can be obtained from NCR.

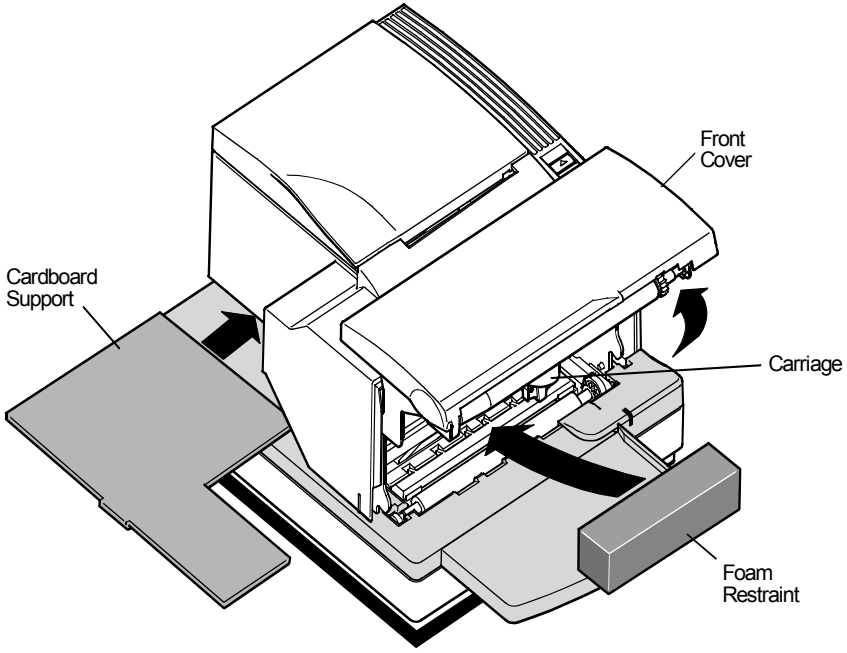
Returning a Printer

Follow these instructions if you need to return a printer for servicing.

1. If you are sending the printer to NCR for repair, call NCR for a Return Material Authorization number (RMA#). Be prepared to answer questions concerning shipping and billing. Request an RMA process be sent to you, if required.
2. Pack the printer as follows:



a. Place receipt paper between the receipt cover and the printhead for protection.



b. Remove the ribbon cassette, move the carriage to the right, and place the foam restraint between the left side of the printer and the carriage to protect the carriage.

c. Place the cardboard support on the Slip Table.

d. Place the printer in the plastic bag and foam pack, place the packed printer in the box and secure the box with packing tape.

3. Write the RMA# on the outside of the box and send the printer to the following address, according to the RMA process:

NCR
The nearest NCR service center address
City, State zip
U.S.A.

RMA # 907456 (sample number for example only)

Chapter 4: Printer & Media Supplies

Ordering Thermal Paper

Thermal Paper Specifications

The printer requires qualified thermal paper with the following dimensions:

Width	Diameter	Length
80 mm + .2 mm - .6 mm (3.15 + .008 in. - .024 in.)	90 mm max. (3.54 in.)	98 meters (322 ft.) 2.4 mil thick 73.5 meters (241 ft.) 3.2 mil thick

The paper must not be attached at the core. Use paper with a colored stripe at the end to indicate that the paper is running low.

The above lengths are based on a core diameter of 22 ± .5 mm (.87 in.) outside, 1.5 ± .5 mm (.45 in.) inside.

NCR can provide paper in small lots to facilitate product evaluation and testing.

To order paper rolls, contact your sales representative or order directly from NCR at the following address or toll free number:

NCR Corporation
Systemedia
9995 Washington Church Road
Miamisburg, OH 45342
1-800-543-8130

Use the following part numbers:

Standard Density	50 Rolls, 90mm diameter	NCR #A152-0034
Light Density	50 Rolls, 90mm diameter	NCR #A152-0035

Ordering Parts and Supplies

Ordering Cash Drawers

Order cash drawers from the following suppliers:

Cash Drawers	Number
NCR	7052-K657

Ordering Power Supply Cord and Adapters

Contact your sales representative to order the power supply and power cords listed in the table. The numbers are for NCR reference only. Suppliers may use other numbers.

Item	Type	Number
Power supply (55 watt) with attached cable to printer and U.S. power supply cord		7158-K330
Power supply (75 watt) with attached cable to printer and U.S. power supply cord		7158-K331
Power supply (55 watt) attached cable		7158-K301
Power supply (75 watt) attached cable		7158-K302
Power supply cord (to outlet)	United States International (no plug) United Kingdom S.E.V. Australia International (with plug)	7158-K320 7158-K321 7158-K322 7158-K323 7158-K324 7158-K326
6-pin female to 3-pin male power adapter		7158-K303
3-pin female to 6-pin male power adapter		7158-K304

Ordering Communication Cables

Contact your sales representative to order the communication cables listed in the table. The numbers are for reference only. Suppliers may use other numbers.

Communication Cables	Length	Order Number
RS-232C 9-pin to 9 pin	(0.7 meters—2 ft.)	1416-C359-0007
RS-232C 9-pin to 9 pin	(4.0 meters—13 ft.)	1416-C266-0040

Forms Specifications

The 7158 prints on single- or multiple-part forms in the slip station (up to five-part forms). Forms and slips must meet the following requirements:

- Front insertion (minimum):
  51 mm (2.00 inches) wide
  68 mm (2.68 inches) long
- Side insertion (minimum):
  203 mm (8.0 inches) wide
  51 mm (2.0 inches) long
- Single-ply forms should be on paper that is greater than 15 pounds
- Multiple-part forms (up to five parts) should be no thicker than .40 mm
  (.016 inches) and a minimum thickness of .08 mm (.003 inches).

  Note: Do not use forms containing holes along the top or right edge.

- Forms for use with Flip Check (minimum)
  51 mm (2.00 inches) wide
  70 mm (2.75 inches) long

Check Specifications

Check American Standards ANSI X9.13 and ANSI X9.18, and International Standard ISO 1004 define specifications for paper.

- Minimum check size: 70 mm (2.75 in.) wide x 152 mm (6.00 in.) long
- Maximum check size: 95 mm (3.75 in.) wide x 222 mm (8.75 in.) long

Ordering Ribbon Cassettes

To order ribbon cassettes, contact your sales representative or order from NCR at the following address or toll free number:

NCR Corporation
Systemedia
9995 Washington Church Road
Miamisburg, OH 45342
1-800-543-8130

Ordering Extended Slip Tables

Contact a sales representative to order slip tables. The numbers listed below are for reference only. Suppliers may use other numbers.

Extended Slip Table (Standard)	7158-K280
Extended Slip Table (Short)	7158-K281

Ordering Documentation

See the IP Web Site (*http://info.ncr.com*)for the following online documentation:

Item	Number
7158 Owner's Guide	7158-0000-1112
7158 Service Guide	7158-0000-1113

Chapter 5: Technical Specifications

Functional Description

Standard Slip Features

Print Technology	Bidirectional, logic-seeking, nine wire impact printhead
Printhead Features	Automatic homing and jam detection
Ink Means	3 or 5 million character life Carriage mounted ribbon cassette
Print Resolution	Standard 139 DPI X 72 DPI Compressed 171 DPI X 72 DPI
Character Cell	10 Half Dots x 7 Dots High
Print Line Width	Standard 66 characters @ 13.9 CPI Compressed 80 characters @ 17.1 CPI
Enhanced Print	Double wide and rotated character Double strike to improve contrast
Print Line Spacing	Standard 7.2 lines/inch
Print Line Rate	Full 40 columns at 290 LPM @ 13.9 CPI
Paper Feed	Bi-directional, 4.6 IPS, maximum
Forms Handling	Horizontal Slip Table Retractable slip stop Front/side insertion

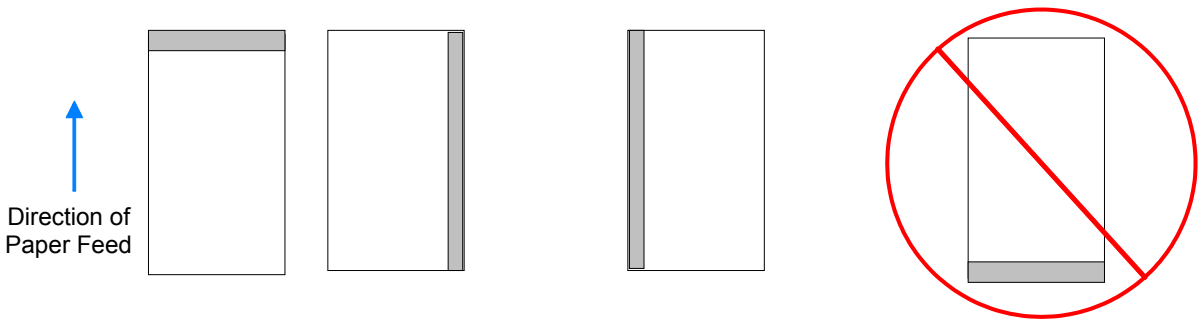
Forms Capability *** See notes on the following page.**	Maximum thickness .40 mm (.016 inch) max., 5 plies Minimum .08 mm (.003 inch) Minimum Form Reflectivity 60% Minimum Length: 68 mm (2.68 inches) w/o check flip option 70 mm (2.75 inches) with flip option Minimum Width: 51 mm (2.00 inches) [Ensures that forms cover both the optical slip detectors and expose about one inch of the form to push in place.]
Forms Detection	Leading edge sensor at forms stop Trailing edge sensor in right margin.
Indicators	Green LED "Slip-in" light
Character Sets	PC Code Page 437 PC Code Page 850 PC Code Page 852 PC Code Page 858 PC Code Page 860 PC Code Page 863 PC Code Page 865 PC Code Page 866 resident Additional Flash memory for user-defined characters
Graphics	139 DPI X 72 DPI bit-mapped, input as 7 and 8 dot high unidirectional print lines.
Bar Code Fonts	UPC-A UPC-E JAN8 JAN13 (EAN) Code 39 Interleaved 2 of 5 Codabar Code 128 Code 93

Slip Forms - Recommendations

The slip form should be flat and void of curls or wrinkles, especially at the top.

Considerations for bound edges on slip paper (multi-page forms):

- Binding on the leading edge (top): Best method, however paper feeding and insertion can be affected by the binding method, the length of the edge, and the quality of glue used.
- Binding on the right edge: Paper feeding and insertion can be affected by the binding method, the length of the edge, and the quality of glue used.
- Binding on the Left edge or wide slip paper: Skewing may occur.
- Binding on the bottom edge: Not recommended

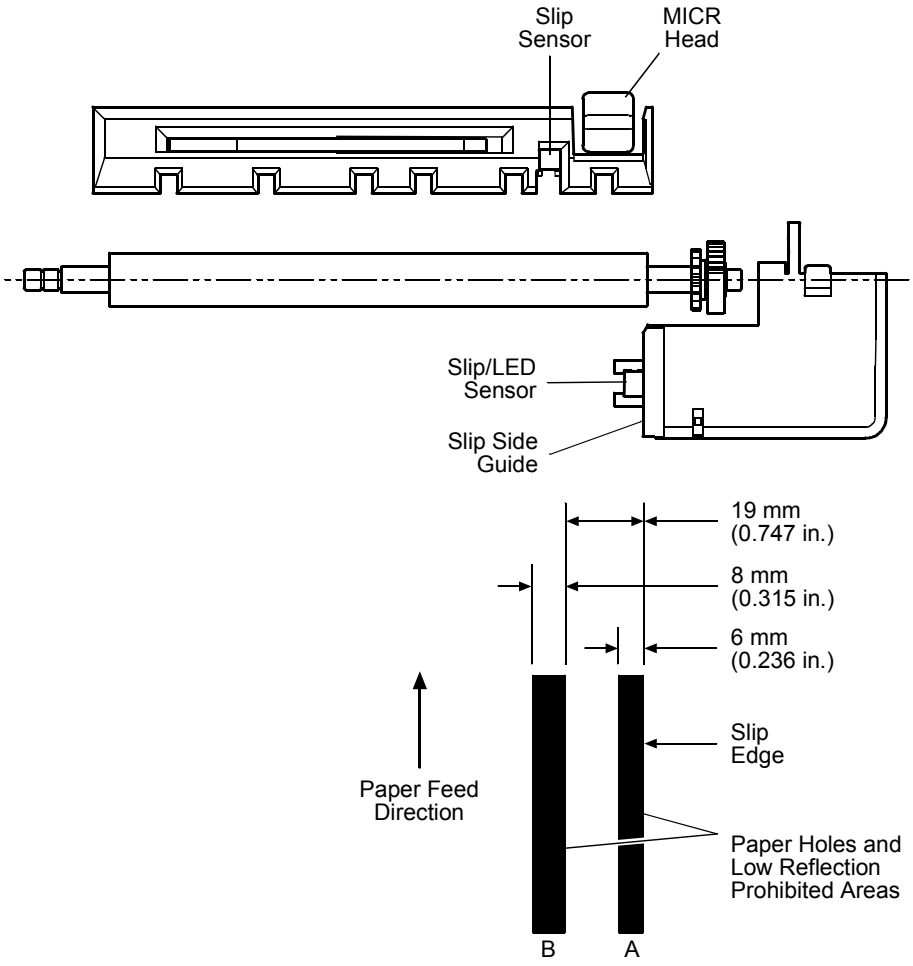


Bound Edge on Top or Right
Paper feeding and insertion affected by the binding method, length of page, and the quality of the adhesive used.)

Bound Edge on Left
Scewing can occur

Bound Edge on Bottom
Do **NOT** use

20526



The Slip/LED Sensors use a reflective photo sensor.

- Do not use paper that has holes or is translucent at the Slip/LED Sensor location. (See "A" in above illustration.)
- Do not use paper that has holes on dark areas with low reflection (less than 60% reflection) at the Slip Sensor location. (See "B" in above illustration.)
- Thin paper should be used between the top and bottom sheets of multi-ply paper. Thick paper reduces the copy capability.

MICR Reader – Additional Information

- The check must be flat and void of curls, folds, or wrinkles (especially at the edges). Wrinkled checks may rub against the ribbon causing them to become ink-stained.
- Checks must be void of clips or staples. Paper jams, MICR read errors, and/or MICR head damage could occur.
- Immediately release the check once the printer starts to feed it. Failure to release the check could skew it, causing paper jams and MICR read errors.

Standard Receipt Features

Print Technology	Direct thermal 640 dot printhead
Print Resolution	203 DPI horizontal and vertical 8 dots/mm
Character Cell	Standard 13 X 24 Compressed 10 X 24
Print Width	Standard 44 characters @ 15.6 CPI Compressed 56 characters @ 20.3 CPI
Enhanced Print	Double Wide, Double High, Rotated, Underlined, Scalable, Italic, Superscript, Subscript, Bold, and Reversed Image characters
Print Line Spacing	7.52 lines/inch, standard
Print Line Rate	38.4 LPS for text at standard spacing. See Receipt Throughput
Paper Feed	Unidirectional, 130mm/second maximum. See Receipt Throughput
Paper Sensing	Paper exhaust switch Paper low switch (adjustable).
Operator Interface	Paper Feed Button on cabinet

Character Sets	PC Code Page 437 PC Code Page 850 PC Code Page 852 PC Code Page 858 PC Code Page 860 PC Code Page 863 PC Code Page 865 PC Code Page 866 resident Additional Flash memory for user-defined characters
Graphics	203 DPI X 203 DPI bit-mapped, input as 24 dot high print lines
Bar Code Fonts	UPC-A UPC-E JAN8 JAN13 (EAN) Code 39 Interleaved 2 of 5 Codabar Code 128 PDF-417 Two-dimensional Code Code 93

Optional Features

Paper Cutter	Rotary partial cut knife leaves 5.0 mm (0.2 inch) uncut on left edge.
Slip Table Kits	Extends Slip Table 38 mm (1.5 in.) or 76 mm (3.0 in.) in front. The 76 mm slip table comes standard with the MICR and Flip options.
MICR Reader	Integrated into the slip station. Reads MICR checks oriented for validation on the back of the check, and communicates the character string to the host computer. Reads E13B and CMC7 MICR Fonts (Auto discriminates).
Check Flip	Error and fraud prevention feature. Turns validated checks over for printing on the face of the check.
Remote Power Supply	55W standard 75W available Auto-Ranging input 24Vdc output
Interface daughter PCBs	RS-232C, 9 pin connector USB

Reliability

The numbers in the table refer to the Mean Cycles Between Failure (MCBF) for the items indicated.

Thermal Receipt Printer	45 Million Lines
Impact Slip Printer	15 Million Lines
Impact Printhead	200 Million Characters
Knife	1.5 Million Cuts
MICR Check Reader	200,000 Reads
Ribbon Cassette	3 or 5 Million Characters
Check Flip	200,000 Flips
Electronics	240,000 hours (MTBF)

Certifications

EMI:

- FCC, Class A
- Industry Canada, Class A
- VCCI, Class A
- CE Mark, Class B
- Austel, Class B

Safety:

- UL 1950
- CSA 22.2 No. 950
- CE Mark (EN60950)

Physical and Operating Environment

Temperature and Humidity

	Temperature in Degrees	%Humidity
Operating: w/ Knife	5C to 28C (41F to 82F)	10 to 90
	28C to 45C (82F to 113F)	10 to 35
Operating: w/o Knife	5C to 35C (41F to 95F)	5 to 90
	35C to 50C (95F to 122F)	5 to 40
Storage:	-10C to 50C (14F to 122F)	5 to 90
Transit:	-40C to 60C (-40F to 140F)	5 to 95

Electrical

The 7158 printer complies with the regulatory EMI standards and levels indicated in the section on Certifications when tested as a stand-alone unit.

When connected to a host terminal or system, the 7158 also complies with these standards and levels, provided that the host terminal or system first complies without the 7158 printer connected.

Slip Media

The 7158 prints 1 to 5 part forms with the following limitations:

- The minimum thickness of a single part form is .08 mm (.003 inch).
- If present in a multi-part form, cardstock will be the bottom part.
- Maximum total thickness is .40 mm (.016 inch).
- Minimum form reflectivity is 60%

Minimum form length (feed direction) for forms inserted from the front up to the slip stop is 68 mm (2.68 inches) w/o check flip option and 70 mm (2.75 inches) w/Flip option. Minimum form width (print direction) is 51 mm (2.00 inches). These minimums ensure the form covers both optical slip detectors, and expose about one inch of the form to push in place.

The form must be at least 127 mm (5.00 inches) wide to print all 66 standard or 80 compressed columns. Large forms may be inserted from the left side and override the slip stop. Forms over 170 mm (6.70 inches) wide will extended outside the left side of the printer.

Receipt Media

- Direct thermal paper, with or without environmental coating.
- Paper thickness range: 51–86 µm (2.0–3.4 mil).
- Receipt roll width: 80 + .2 - .6 mm (3.150 + .008 - .024 inch).
- Receipt roll diameter: 90 mm (3.54 inch) maximum.
- Receipt roll capacity: * 98M (322 feet) of 61µm (2.4 mil) thick paper

  73.5M (241 feet) of 81µm (3.2 mil) thick paper
- Roll construction: Image side facing out.
- End-of-roll warning: Stripe recommended, not required.

* Based on core diameter of: 22 ± .5 mm (.87 inch) outside,
11.5 ± .5 mm (.45 inch) inside.

Migration

The 7158's standard command set allows it to work with software written for NCR or other ESC/POS™ compliant printers.

The 7158 supports two modes of operation: "A756 emulation" and "A758 native" modes. When the 7158 is configured for A756 emulation mode through the Configuration Menu, the printer is backward compatible to 7156 slip and receipt applications except that receipt print resolution is increased from 6 to 8 dots/mm. If the 6 to 8 dot/mm conversion features are not used, this will result in the size of graphics being reduced by 25%.

See Chapter 7: Programming Guide for a comparison to the 7156.

Performance Requirements

Slip Printing

Slip Positioning

Forms are inserted from the front, top-of-form first, up to a form stop behind the carriage, or inserted from the left side and over-ride the form stop. In each case the form must be aligned with the check guide (right edge of the slip path). A pair of optical sensors are located (a) 11 mm (.45 inch) above the print centerline and 25 mm (1.00 inch) from the check guide, and (b) just inside the check guide and 37 mm (1.45 inches) below the print centerline. The application can use these for form-in and trailing edge detection. A green slip-in LED indicates when both detectors are covered.

The application moves the form bi-directionally in 1/72-inch increments to position the first line of print.

Slip Format

Maximum print line width: 120.7 mm (4.752 inches) starting 3.20 mm ± 1.5 mm (.125 inch ± .060 inch) from the right edge of the form.

	Standard Font	Compressed Font
Character Cell	10 half dots x 7 dots	10 half dots x 7 dots
Character Size	7 x 7	7 x 7
Character Per Line	66 @ 13.9 CPI	80 @ 17.1 CPI
Graphics Capability	330 full dots 660 half dots	N/A N/A

Print line height: 7 dots @ 1/72 inch + Extra Dot Rows:

0 EDR between lines:	2.47 mm (.097 inch) ±5% = 10.3 LPI
1 EDR:	2.82 mm (.111 inch) ±5% = 9.0 LPI
2 EDR:	3.18 mm (.125 inch) ±5% = 8.0 LPI
3 EDR (standard):	3.53 mm (.139 inch) ±5% = 7.2 LPI
4 EDR:	3.88 mm (.153 inch) ±5% = 6.5 LPI
5 EDR:	4.23 mm (.167 inch) ±5% = 6.0 LPI
N EDR:	(7+N)/72 in. ±5%

Minimum top margin (form against form stop): 16.0 mm (.63 inch)

Minimum top margin (after reverse feeding): 5.0 mm (.20 inch)

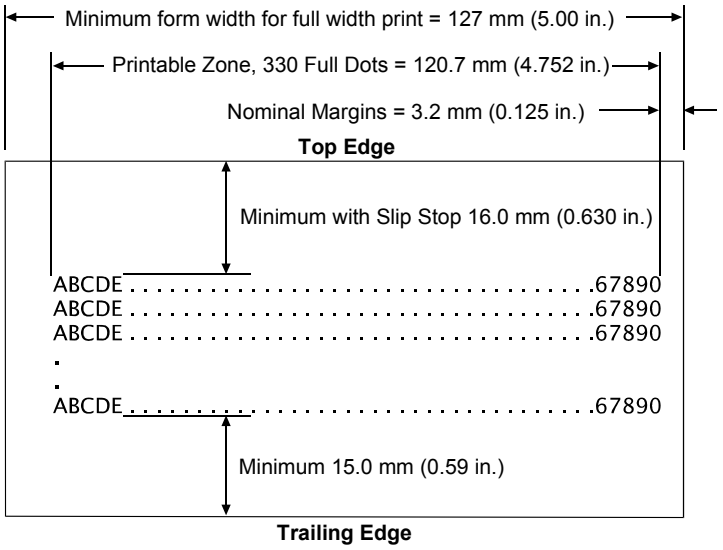
Minimum bottom margin: 15.0 mm (.59 inch)

Slip Throughput

Bi-directional line speed is based on a printhead speed of 260 CPS. Throughput (±5%) at the standard line spacing (7.2 LPI) depends on line length expressed in characters:

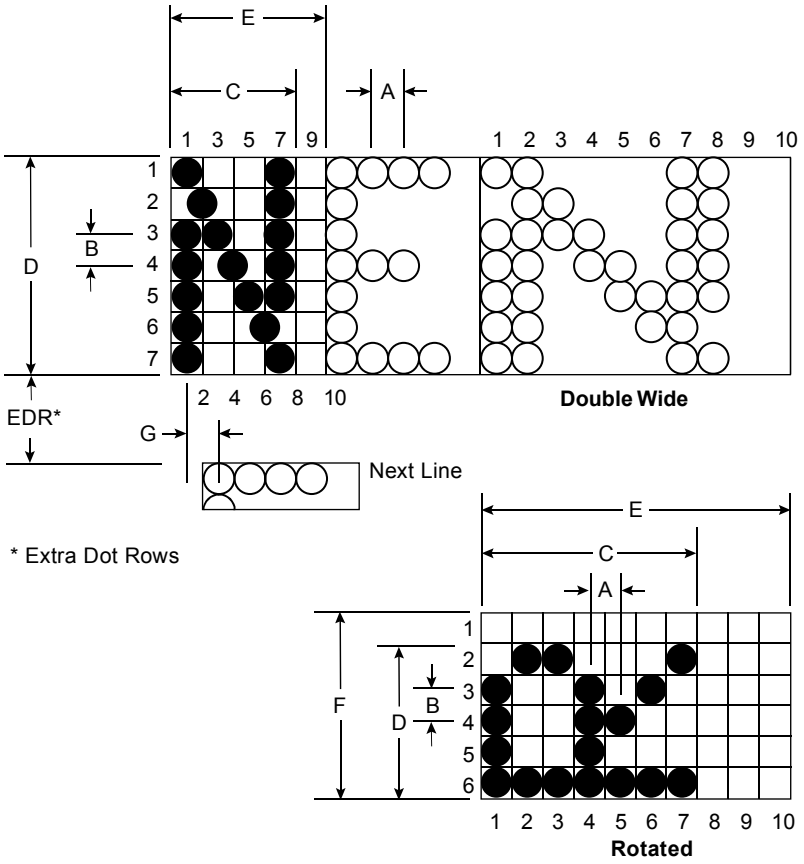
Line Length	Character Density	Lines Per Minute
40 Chars.	13.9 CPI (standard)	290 LPM
52 Chars.	13.9 CPI (standard)	237 LPM
66 Chars.	13.9 CPI (standard)	195 LPM
80 Chars.	17.1 CPI (compressed)	166 LPM

Unidirectional (graphics) line speed, will be half the above throughput.


Minimum form width for full width print = 127 mm (5.00 in.)
Printable Zone, 330 Full Dots = 120.7 mm (4.752 in.)
Nominal Margins = 3.2 mm (0.125 in.)
Top Edge
Minimum with Slip Stop 16.0 mm (0.630 in.)
ABCDE 67890
ABCDE 67890
ABCDE 67890
ABCDE 67890
Minimum 15.0 mm (0.59 in.)
Trailing Edge

Character Format

The 7158 can place 66 standard characters, or 80 compressed characters, or 33 rotated characters, or 330 adjacent bits of graphics (660 addressable positions) in the 121 mm (4.752 inch) wide print zone. Minimum line height is 7 dots (.097 inch) for vertical print or graphics, and 6 dots (.083 inch) for rotated print.



Dimension	Standard		Compressed		Rotated	
	mm	inch	mm	inch	mm	inch
A	.36	.0144	.30	.0117	.36	.0144
B	.35	.0139	.35	.0139	.35	.0139
C	1.46	.0576	1.19	.0468	2.56	.1008
D	2.47	.0973	2.47	.0973	1.76	. 0695
E	1.83	.0720	1.48	.0585	3.66	.1440
F	N/A	N/A	N/A	N/A	2.11	.0834
G	.35 Max.	.014 Max.	.35 Max.	.014 Max.	.35 Max.	.014" Max.

Allowable Duty Cycle (measured over one minute of continuous printing)

The impact printhead can continuously print the following average number of characters over a one minute period.

Ambient Temperature in degrees:	5C	20C	35C	50C
11.5 Dots/Char. avg.:	7200CH	6000CH	4800CH	3600CH
15.0 Dots/Char. avg.:	5700CH	4800CH	3900CH	3000CH
19.0 Dots/Char. avg.:	4200CH	3600CH	3000CH	2400CH

No one print wire may exceed 18% of the dots printed.

Ribbon Life

The snap-on purple and black ink ribbon cassettes are available in 3 and 5 million character cartridge lives.

Receipt Printing

Receipt Format, 80mm Paper Width

Print line width: 576 dots @ 8 dots/mm centered on 80 mm.

	Standard Font	Compressed Font
Character Cell	13 x 24 dots	10 x 24 dots
Character Per Line	44 @ 15.6 CPI	56 @ 20.3 CPI
Nominal Margins	4.25 mm (.167 inch)	5.00 mm (.200 inch)
Minimum Margins	2.00 mm (.079 inch)	2.50 mm (.098 inch)

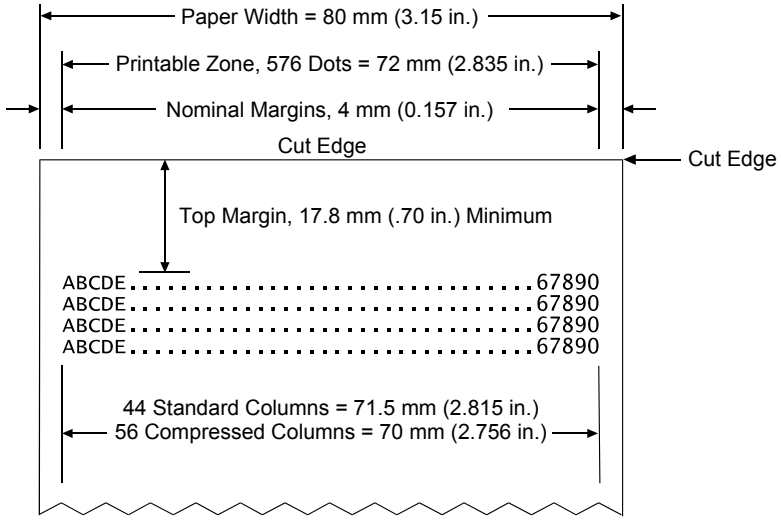
Print line height: 24 dots @ 8 dots/mm + Extra Dot Rows between lines

0 EDR:	3.00 mm (.118 inch) ±3%	= 8.47 LPI
1 EDR:	3.12 mm (.123 inch) ±3%	= 8.13 LPI
2 EDR:	3.25 mm (.128 inch) ±3%	= 7.81 LPI
3 EDR (Standard):	3.37 mm (.133 inch) ±3%	= 7.52 LPI
4 EDR:	3.50 mm (.138 inch) ±3%	= 7.25 LPI
5 EDR:	3.62 mm (.143 inch) ±3%	= 7.00 LPI
10 EDR:	4.25 mm (.167 inch) ±3%	= 5.98 LPI
N EDR:	(3 + N/8) mm ±3%	

Top margin to manual tearoff: (non-Knife) 9.75 mm (.384 inch) minimum.

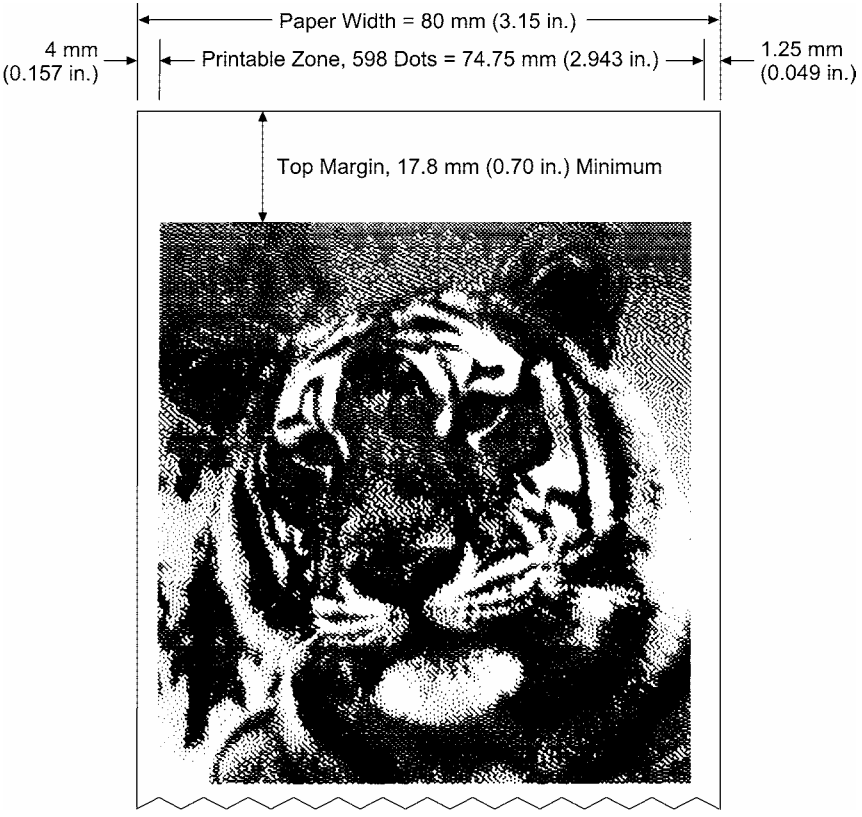
Top margin to knife cut: 17.80 mm (.700 inch) minimum.

Print Zone

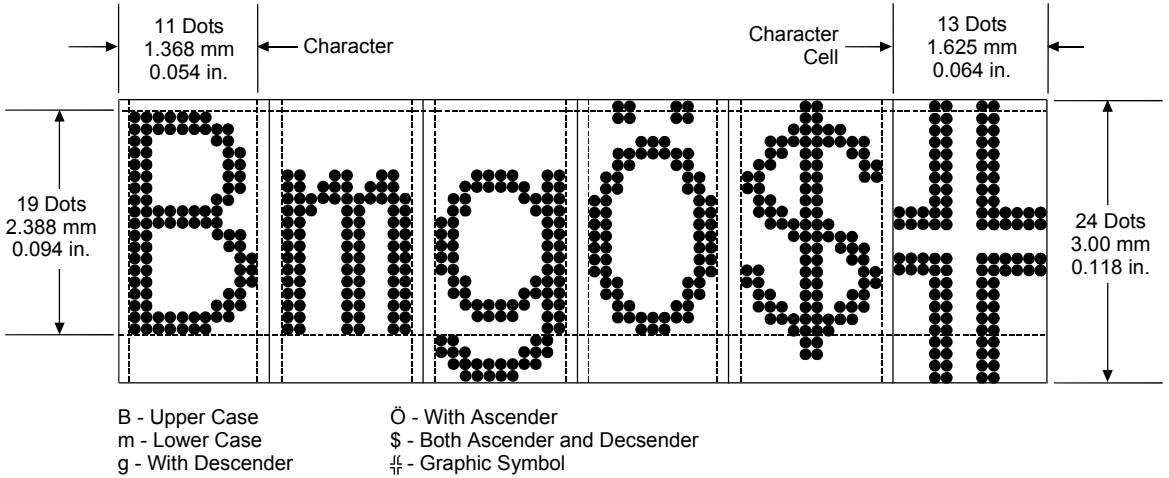

Paper Width = 80 mm (3.15 in.)
Printable Zone, 576 Dots = 72 mm (2.835 in.)
Nominal Margins, 4 mm (0.157 in.)
Cut Edge
Cut Edge
Top Margin, 17.8 mm (.70 in.) Minimum
ABCDE.....67890
ABCDE.....67890
ABCDE.....67890
ABCDE.....67890
44 Standard Columns = 71.5 mm (2.815 in.)
56 Compressed Columns = 70 mm (2.756 in.)

The application centers 44 standard character cells (13 X 24 dots), or 56 compressed character cells (10 X 24 dots), or 576 addressable bits of graphics across an 80 mm wide receipt. Minimum print line height is 24 dots for text or graphics. Standard print line spacing is 27 dots (i.e. 3 extra dot rows).

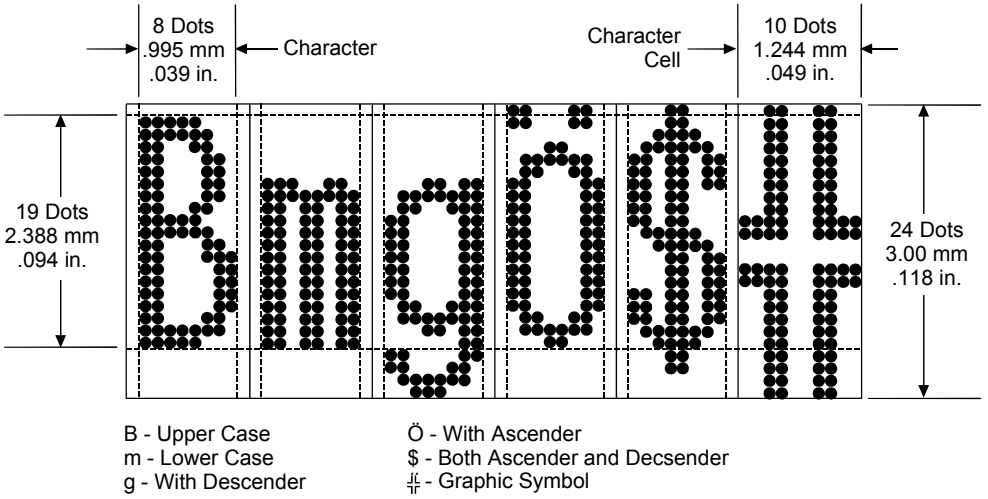
When printing graphics or logos, converted from 6 dot/mm to 8 dot/mm (i.e. designed for 7156), the printable zone is expanded to 598 dots.



Character Pattern for Standard 15.6 CPI Pitch



Character Pattern for Compressed 20.3 CPI Pitch



Receipt Throughput:

Maximum throughput is achieved at any dot coverage up to 25%, which includes any amount of text. But above that, throughput is dependent on the dot coverage and available electrical power.

	25% Dot Coverage (Max Speed)	50% Dot Coverage and 75 W	50% Dot Coverage and 55 W	100% Dot Coverage and 75 W	100% Dot Coverage and 55 W
Dot line period:	0.95 ms	0.95 ms	1.33 ms	2.05 ms	3.3 ms
Paper Speed:	130 mm/sec	130 mm/sec	94 mm/sec	61 mm/sec	38 mm/sec
	5.1 IPS	5.1 IPS	3.7 IPS	2.4 IPS	1.5 IPS
Throughput @ 8.13 LPI:	41.5 LPS	41.5 LPS	30.1 LPS	19.5 LPS	12.2 LPS
Throughput @ 7.52 LPI:	38.4 LPS	38.4 LPS	27.8 LPS	18.0 LPS	11.3 LPS
Throughput @ 5.98 LPI:	30.5 LPS	30.5 LPS	22.1 LPS	14.4 LPS	9.0 LPS

Note: Standard receipt has approximately 12% dot coverage.
A full line of text is approximately 25% dot coverage.
Graphics are approximately 40% dot coverage.
Barcodes have approximately 50% dot coverage.
A solid black line is 100% dot coverage.

In order for an application to achieve the fastest throughput it must ensure that data arrives at the printer at least as fast as it is printed, so the printer will be able to print each line after the preceding line, without stopping to wait for more data. Ideally, an application will send all the data for an entire customer receipt without pausing between characters or lines transmitted.

Allowable Duty Cycle (measured over one minute of continuous printing)

Amount of Dot Coverage	Ambient Temperature		
	25°C	35°C	50°C
20%	100%	50%	20%
40%	50%	25%	10%
100%	20%	10%	4%

Partial Cut Knife

The "partial cut" produces a partial cut that leaves 5.0 ± 1.5 mm (.20 ± .06 inch) paper remaining on the left edge.

Receipt Paper Low:

The paper low assembly lights the On Line, Paper Status, Error LED when the roll is almost exhausted. When the roller ball on the assembly slips into the hollow core of the paper roll, a microswitch opens and paper low is indicated. The customer can adjust the paper low assembly:

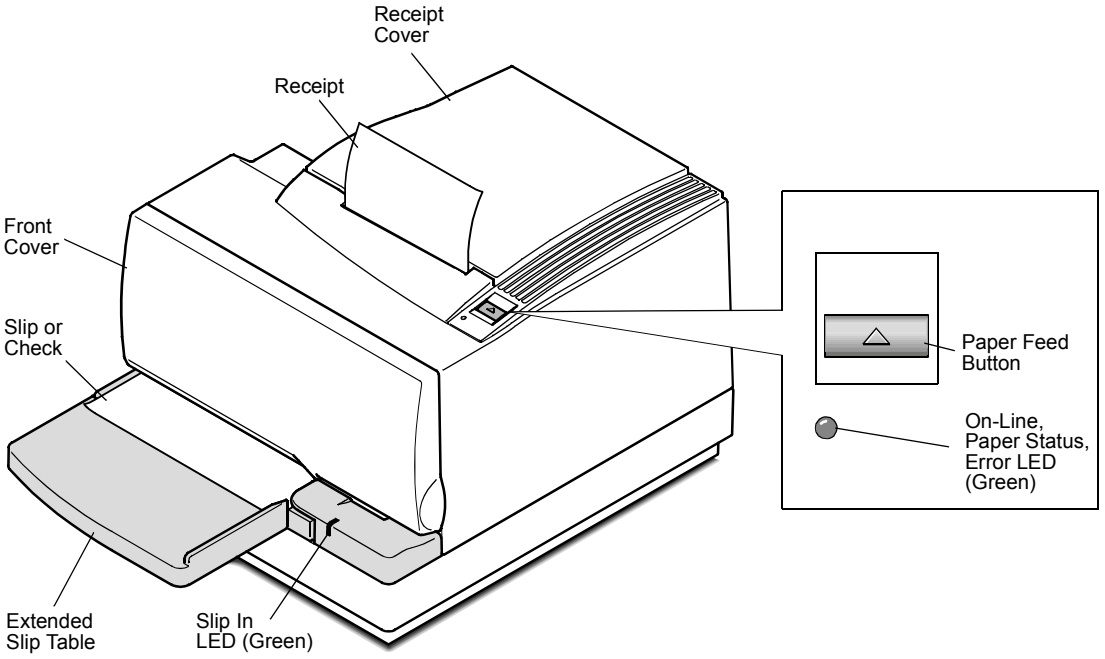
Paper Low Setting	Amount of POS Paper Left
Factory setting	15 ± 10 feet*
Turn screw 1 revolution clockwise	Decrease amount left by 5 feet.
Turn screw 1 revolution CCW	Increase amount left by 5 feet.
Turn screw all the way down CW	Paper low is disabled.

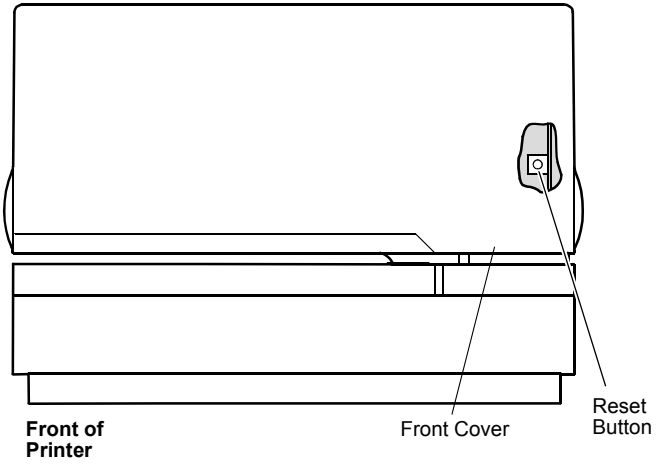
* The above lengths are based on a core diameter of 22 ± 0.5 mm (0.87 inch) outside, 11.5 ± 0.5 mm (0.45 inch) inside.

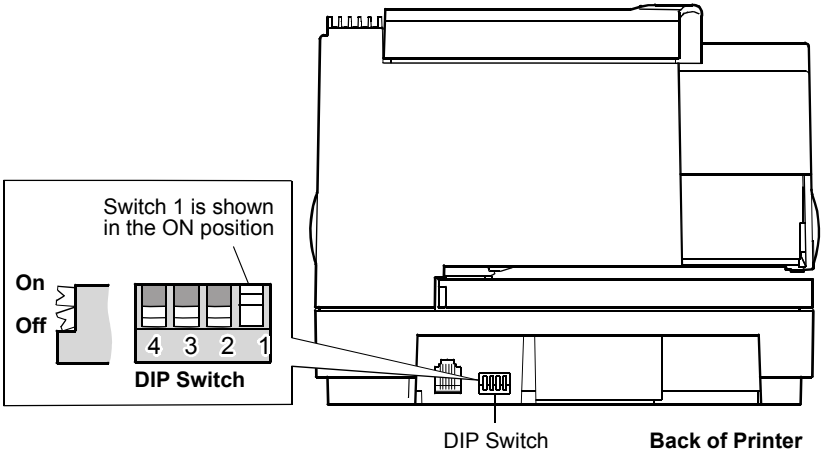
Interface Description

Human Interfaces

- Receipt Paper-loading Door, on top of the cabinet. The receipt station will not print when this door is open. See "Loading Receipt Paper".
- Ribbon Cassette-loading Door, in front of the cabinet. The slip station will not print when this door is open. See "Putting in the Ribbon Cassette".
- Paper Feed Button, on top of the cabinet.
- Manual Reset Button, accessed by opening the front door of the printer.
- 4 position DIP switch, mounted on the Controller PC board, accessed through the rear connector backplate. See the *Programmer's Guide* for communication and diagnostic settings.
- Green Slip-in LED light, adjacent to the right edge of the slip path.
- Application controlled audible tone.
- On Line, Paper Status, Error LED.


Receipt Cover
Receipt
Front Cover
Slip or Check
Paper Feed Button
On-Line, Paper Status, Error LED (Green)
Extended Slip Table
Slip In LED (Green)


Front of Printer
Front Cover
Reset Button



Location of Human and Electrical Interfaces

Power Requirements

The 7158 draws 24VDC ±10% power from its standard 55W, or optional 75W, remote supply. The 7158 printer can accept 24VDC ±10% power from a host terminal. To meet NEC Class 2 safety requirements, the host terminal must provide a time delay fuse on the 24V input.

	Maximum Current	
Print Station	**55 Watt Source**	**75 Watt Source**
Slip station:	6.0A Peak	6.0A Peak
15 Dots/Char. Avg.[1]	2.0A Average	
Solid Graphics[2]		2.7A Average
Receipt Station	6.0A Peak	9.0A Peak
25% Dot Coverage[3]	2.3A Average	
50% Dot Coverage[3]		3.1A Average

Note 1. At rated speed of 260 CPS.
Note 2. Unidirectional printing.
Note 3. At rated speed of 130mm/second.

Electrical Interfaces

The 7158 RS-232C is equipped with a 9 Pin male D-shell connector, which will accept an RS-232 cable with a mating female D-shell.

The 7158 is equipped with a 3 Pin female, which mates with the integral shielded cable on the power supply. The power supply may be plugged into either a 110 or 240 VAC outlet with a grounded AC cord.

The 7158 RS-232C has a cash drawer driver, which use a 6-contact Modular Jack (RJ11). Up to two drawers can be driven; both from one jack with common status.

- Voltage: 24V ±10%
- Maximum current: 2.0 Amps
- Pulse width: 50 to 310 msec, programmable

Switch Settings

These are out-of-service tests or printer settings invoked via the 4 position DIP switch in the back of the printer. Level 1 diagnostics is entered (or exited) by turning switch 1 ON (or off) and resetting or power cycling the printer.

Switch Setting	Paper Feed Button	Printer Function
Switch 1 OFF	Not actuated during reset	Printer ready for normal operation.
	Actuated during reset	Printer configuration message.
Switch 1 ON	Not actuated during reset	Enter download mode to program Flash.
	Actuated during reset	Enter level 1 diagnostics scrolling menu.
Switches 2, 3 and 4		Not Used

Character Sets

These character sets are available for printing:

- Code Page 437 (US)
- Code Page 850 (Multilingual)
- Code Page 852 (Slavic)
- Code Page 858 (with Eurosymbol)
- Code Page 860 (Portuguese)
- Code Page 863 (French Canadian)
- Code Page 865 (Nordic)
- Code Page 866 (Cyrillic)

Code Page 437

00 0	10 16	20 SP 32	30 0 48	40 @ 64	50 P 80	60 ` 96	70 p 112	80 Ç 128	90 É 144	A0 á 160	B0 ⣿ 176	C0 └ 192	D0 ╨ 208	E0 ∝ 224	F0 ≡ 240
01 1	11 17	21 ! 33	31 1 49	41 A 65	51 Q 81	61 a 97	71 q 113	81 ü 129	91 æ 145	A1 í 161	B1 ⣿ 177	C1 ┴ 193	D1 ╤ 209	E1 β 225	F1 ± 241
02 2	12 18	22 " 34	32 2 50	42 B 66	52 R 82	62 b 98	72 r 114	82 é 130	92 Æ 146	A2 ó 162	B2 ⣿ 178	C2 ┬ 194	D2 ╥ 210	E2 Γ 226	F2 ≥ 242
03 3	13 19	23 # 35	33 3 51	43 C 67	53 S 83	63 c 99	73 s 115	83 â 131	93 ô 147	A3 ú 163	B3 ⣿ 179	C3 ├ 195	D3 ╙ 211	E3 π 227	F3 ≤ 243
04 4	14 20	24 $ 36	34 4 52	44 D 68	54 T 84	64 d 100	74 t 116	84 ä 132	94 ö 148	A4 ñ 164	B4 ⣿ 180	C4 ─ 196	D4 ╘ 212	E4 Σ 228	F4 ⌠ 244
05 5	15 21	25 % 37	35 5 53	45 E 69	55 U 85	65 e 101	75 u 117	85 à 133	95 ò 149	A5 Ñ 165	B5 ⣿ 181	C5 ┼ 197	D5 ╒ 213	E5 σ 229	F5 ⌡ 245
06 6	16 22	26 & 38	36 6 54	46 F 70	56 V 86	66 f 103	76 v 118	86 å 134	96 û 150	A6 ª 166	B6 ⣿ 182	C6 ╞ 198	D6 ╓ 214	E6 µ 230	F6 ÷ 246
07 7	17 23	27 ' 39	37 7 55	47 G 71	57 W 87	67 g 103	77 w 119	87 ç 135	97 ù 151	A7 º 167	B7 ⣿ 183	C7 ╟ 199	D7 ╫ 215	E7 τ 231	F7 ≈ 247
08 8	18 24	28 (40	38 8 56	48 H 72	58 X 88	68 h 104	78 x 120	88 ê 136	98 ÿ 152	A8 ¿ 168	B8 ⣿ 184	C8 ╚ 200	D8 ╪ 216	E8 ϕ 232	F8 ° 248
09 9	19 25	29) 41	39 9 57	49 I 73	59 Y 89	69 i 105	79 y 121	89 ë 137	99 Ö 153	A9 ⌐ 169	B9 ⣿ 185	C9 ╔ 201	D9 ┘ 217	E9 Θ 233	F9 ● 249
0A 10	1A 26	2A * 42	3A : 58	4A J 74	5A Z 90	6A j 106	7A z 122	8A è 138	9A Ü 154	AA ¬ 170	BA ⣿ 186	CA ╩ 202	DA ┌ 218	EA Ω 234	FA • 250
0B 11	1B 27	2B + 43	3B ; 59	4B K 75	5B [91	6B k 107	7B { 123	8B ï 139	9B ¢ 155	AB ½ 171	BB ⣿ 187	CB ╦ 203	DB ⣿ 219	EB δ 235	FB √ 251
0C 12	1C 28	2C , 44	3C < 60	4C L 76	5C \ 92	6C l 108	7C | 124	8C î 140	9C £ 156	AC ¼ 172	BC ⣿ 188	CC ╠ 204	DC ▄ 220	EC ∞ 236	FC n 252
0D 13	1D 29	2D - 45	3D = 61	4D M 77	5D] 93	6D m 109	7D } 125	8D ì 141	9D ¥ 157	AD ¡ 173	BD ⣿ 189	CD ═ 205	DD ▌ 221	ED ∅ 237	FD ² 253
0E 14	1E 30	2E . 46	3E > 62	4E N 78	5E ^ 94	6E n 110	7E ~ 126	8E Ä 142	9E Pt 158	AE « 174	BE ⣿ 190	CE ╬ 206	DE ▐ 222	EE ε 238	FE ■ 254
0F 15	1F 31	2F / 47	3F ? 63	4F O 79	5F _ 95	6F o 111	7F DEL △ 127	8F Å 143	9F ƒ 159	AF » 175	BF ⣿ 191	CF ╧ 207	DF ▀ 223	EF ∩ 239	FF BLANK 255

Code Page 850

00 0	10 16	20 32	30 0 48	40 @ 64	50 P 80	60 ` 96	70 p 112	80 Ç 128	90 É 144	A0 á 160	B0 ▒ 176	C0 └ 192	D0 ð 208	E0 Ó 224	F0 240
01 1	11 17	21 ! 33	31 1 49	41 A 65	51 Q 81	61 a 97	71 q 113	81 ü 129	91 æ 145	A1 í 161	B1 ▓ 177	C1 ┴ 193	D1 Đ 209	E1 ß 225	F1 ± 241
02 2	12 18	22 " 34	32 2 50	42 B 66	52 R 82	62 b 98	72 r 114	82 é 130	92 Æ 146	A2 ó 162	B2 ▓ 178	C2 ┬ 194	D2 Ê 210	E2 Ô 226	F2 ‗ 242
03 3	13 19	23 # 35	33 3 51	43 C 67	53 S 83	63 c 99	73 s 115	83 â 131	93 ô 147	A3 ú 163	B3 │ 179	C3 ├ 195	D3 Ë 211	E3 Ò 227	F3 ¾ 243
04 4	14 20	24 $ 36	34 4 52	44 D 68	54 T 84	64 d 100	74 t 116	84 ä 132	94 ö 148	A4 ñ 164	B4 ┤ 180	C4 ─ 196	D4 È 212	E4 õ 228	F4 ¶ 244
05 5	15 21	25 % 37	35 5 53	45 E 69	55 U 85	65 e 101	75 u 117	85 à 133	95 ò 149	A5 Ñ 165	B5 Á 181	C5 ┼ 197	D5 ı 213	E5 Õ 229	F5 § 245
06 6	16 22	26 & 38	36 6 54	46 F 70	56 V 86	66 f 103	76 v 118	86 å 134	96 û 150	A6 ª 166	B6 Â 182	C6 ã 198	D6 Í 214	E6 µ 230	F6 ÷ 246
07 7	17 23	27 ' 39	37 7 55	47 G 71	57 W 87	67 g 103	77 w 119	87 ç 135	97 ù 151	A7 º 167	B7 À 183	C7 Ã 199	D7 Î 215	E7 þ 231	F7 ¸ 247
08 8	18 24	28 (40	38 8 56	48 H 72	58 X 88	68 h 104	78 x 120	88 ê 136	98 ÿ 152	A8 ¿ 168	B8 © 184	C8 ╚ 200	D8 Ï 216	E8 Þ 232	F8 º 248
09 9	19 25	29) 41	39 9 57	49 I 73	59 Y 89	69 i 105	79 y 121	89 ë 137	99 Ö 153	A9 ® 169	B9 ╣ 185	C9 ╔ 201	D9 ┘ 217	E9 Ú 233	F9 ¨ 249
0A 10	1A 26	2A * 42	3A : 58	4A J 74	5A Z 90	6A j 106	7A z 122	8A è 138	9A Ü 154	AA ¬ 170	BA ║ 186	CA ╩ 202	DA ┌ 218	EA Û 234	FA · 250
0B 11	1B 27	2B + 43	3B ; 59	4B K 75	5B [91	6B k 107	7B { 123	8B ï 139	9B ø 155	AB ½ 171	BB ╗ 187	CB ╦ 203	DB ▉ 219	EB Ù 235	FB ¹ 251
0C 12	1C 28	2C , 44	3C < 60	4C L 76	5C \ 92	6C l 108	7C | 124	8C î 140	9C £ 156	AC ¼ 172	BC ╝ 188	CC ╠ 204	DC ▄ 220	EC ý 236	FC ³ 252
0D 13	1D 29	2D - 45	3D = 61	4D M 77	5D] 93	6D m 109	7D } 125	8D ì 141	9D Ø 157	AD ¡ 173	BD ¢ 189	CD ═ 205	DD ¦ 221	ED Ý 237	FD ² 253
0E 14	1E 30	2E . 46	3E > 62	4E N 78	5E ^ 94	6E n 110	7E ~ 126	8E Ä 142	9E × 158	AE « 174	BE ¥ 190	CE ╬ 206	DE Ì 222	EE ¯ 238	FE ■ 254
0F 15	1F 31	2F / 47	3F ? 63	4F O 79	5F _ 95	6F o 111	7F △ 127	8F Å 143	9F ƒ 159	AF » 175	BF ┐ 191	CF ¤ 207	DF ▀ 223	EF ´ 239	FF 255

Code Page 852

00 0	10 16	20 32	30 0 48	40 @ 64	50 P 80	60 ` 96	70 p 112	80 Ç 128	90 É 144	A0 á 160	B0 ▒ 176	C0 └ 192	D0 đ 208	E0 Ó 224	F0 240
01 1	11 17	21 ! 33	31 1 49	41 A 65	51 Q 81	61 a 97	71 q 113	81 ü 129	91 Ĺ 145	A1 í 161	B1 ▓ 177	C1 ┴ 193	D1 Đ 209	E1 ß 225	F1 ´ 241
02 2	12 18	22 " 34	32 2 50	42 B 66	52 R 82	62 b 98	72 r 114	82 é 130	92 Í 146	A2 ó 162	B2 ▓ 178	C2 ┬ 194	D2 Ď 210	E2 Ô 226	F2 ˛ 242
03 3	13 19	23 # 35	33 3 51	43 C 67	53 S 83	63 c 99	73 s 115	83 â 131	93 ô 147	A3 ú 163	B3 │ 179	C3 ├ 195	D3 Ë 211	E3 Ń 227	F3 ˇ 243
04 4	14 20	24 $ 36	34 4 52	44 D 68	54 T 84	64 d 100	74 t 116	84 ä 132	94 ö 148	A4 Ą 164	B4 ┤ 180	C4 ─ 196	D4 ď 212	E4 ń 228	F4 ˆ 244
05 5	15 21	25 % 37	35 5 53	45 E 69	55 U 85	65 e 101	75 u 117	85 ů 133	95 Ľ 149	A5 ą 165	B5 Á 181	C5 ┼ 197	D5 Ň 213	E5 ň 229	F5 § 245
06 6	16 22	26 & 38	36 6 54	46 F 70	56 V 86	66 f 103	76 v 118	86 ć 134	96 ľ 150	A6 Ž 166	B6 Â 182	C6 Ă 198	D6 Í 214	E6 Š 230	F6 ÷ 246
07 7	17 23	27 ' 39	37 7 55	47 G 71	57 W 87	67 g 103	77 w 119	87 ç 135	97 Ś 151	A7 ž 167	B7 Ě 183	C7 ă 199	D7 Î 215	E7 š 231	F7 ¸ 247
08 8	18 24	28 (40	38 8 56	48 H 72	58 X 88	68 h 104	78 x 120	88 ł 136	98 ś 152	A8 Ę 168	B8 Ş 184	C8 ╚ 200	D8 ě 216	E8 Ŕ 232	F8 ° 248
09 9	19 25	29) 41	39 9 57	49 I 73	59 Y 89	69 i 105	79 y 121	89 ë 137	99 Ö 153	A9 ę 169	B9 ╣ 185	C9 ╔ 201	D9 ┘ 217	E9 Ú 233	F9 ¨ 249
0A 10	1A 26	2A * 42	3A : 58	4A J 74	5A Z 90	6A j 106	7A z 122	8A Ő 138	9A Ü 154	AA 170	BA ║ 186	CA ╩ 202	DA ┌ 218	EA ŕ 234	FA · 250
0B 11	1B 27	2B + 43	3B ; 59	4B K 75	5B [91	6B k 107	7B { 123	8B ő 139	9B Ť 155	AB ź 171	BB ╗ 187	CB ╦ 203	DB ▉ 219	EB Ű 235	FB ű 251
0C 12	1C 28	2C , 44	3C < 60	4C L 76	5C \ 92	6C l 108	7C | 124	8C î 140	9C ť 156	AC Č 172	BC ╝ 188	CC ╠ 204	DC ▄ 220	EC ý 236	FC Ř 252
0D 13	1D 29	2D - 45	3D = 61	4D M 77	5D] 93	6D m 109	7D } 125	8D Ź 141	9D Ł 157	AD ş 173	BD Ž 189	CD ═ 205	DD Ţ 221	ED Ý 237	FD ř 253
0E 14	1E 30	2E . 46	3E > 62	4E N 78	5E ^ 94	6E n 110	7E ~ 126	8E Ä 142	9E × 158	AE « 174	BE ž 190	CE ╬ 206	DE Ů 222	EE ţ 238	FE ■ 254
0F 15	1F 31	2F / 47	3F ? 63	4F O 79	5F _ 95	6F o 111	7F △ 127	8F Ć 143	9F č 159	AF » 175	BF ┐ 191	CF ¤ 207	DF ▀ 223	EF ´ 239	FF 255

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00	10	20	30	40	50	60	70	80	90	A0	B0	C0	D0	E0	F0
0	16	32	0 48	@ 64	P 80	` 96	p 112	Ç 128	É 144	á 160	⁝⁝⁝ 176	└ 192	ð 208	Ó 224	– 240
01	11	21	31	41	51	61	71	81	91	A1	B1	C1	D1	E1	F1
1	17	! 33	1 49	A 65	Q 81	a 97	q 113	ü 129	æ 145	í 161	▒ 177	┴ 193	Ð 209	ß 225	± 241
02	12	22	32	42	52	62	72	82	92	A2	B2	C2	D2	E2	F2
2	18	" 34	2 50	B 66	R 82	b 98	r 114	é 130	Æ 146	ó 162	▓ 178	┬ 194	Ê 210	Ô 226	— 242
03	13	23	33	43	53	63	73	83	93	A3	B3	C3	D3	E3	F3
3	19	# 35	3 51	C 67	S 83	c 99	s 115	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
04	14	24	34	44	54	64	74	84	94	A4	B4	C4	D4	E4	F4
4	20	$ 36	4 52	D 68	T 84	d 100	t 116	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
05	15	25	35	45	55	65	75	85	95	A5	B5	C5	D5	E5	F5
5	21	% 37	5 53	E 69	U 85	e 101	u 117	à 133	ò 149	Ñ 165	Á 181	┼ 197	€ 213	Õ 229	§ 245
06	16	26	36	46	56	66	76	86	96	A6	B6	C6	D6	E6	F6
6	22	& 38	6 54	F 70	V 86	f 103	v 118	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
07	17	27	37	47	57	67	77	87	97	A7	B7	C7	D7	E7	F7
7	23	' 39	7 55	G 71	W 87	g 103	w 119	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
08	18	28	38	48	58	68	78	88	98	A8	B8	C8	D8	E8	F8
8	24	(40	8 56	H 72	X 88	h 104	x 120	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	º 248
09	19	29	39	49	59	69	79	89	99	A9	B9	C9	D9	E9	F9
9	25	) 41	9 57	I 73	Y 89	i 105	y 121	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
0A	1A	2A	3A	4A	5A	6A	7A	8A	9A	AA	BA	CA	DA	EA	FA
10	26	* 42	: 58	J 74	Z 90	j 106	z 122	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
0B	1B	2B	3B	4B	5B	6B	7B	8B	9B	AB	BB	CB	DB	EB	FB
11	27	+ 43	; 59	K 75	[91	k 107	{ 123	ï 139	ø 155	½ 171	╗ 187	╦ 203	▉ 219	Ù 235	¹ 251
0C	1C	2C	3C	4C	5C	6C	7C	8C	9C	AC	BC	CC	DC	EC	FC
12	28	, 44	< 60	L 76	\ 92	l 108	| 124	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	³ 252
0D	1D	2D	3D	4D	5D	6D	7D	8D	9D	AD	BD	CD	DD	ED	FD
13	29	- 45	= 61	M 77	] 93	m 109	} 125	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
0E	1E	2E	3E	4E	5E	6E	7E	8E	9E	AE	BE	CE	DE	EE	FE
14	30	. 46	> 62	N 78	^ 94	n 110	~ 126	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
0F	1F	2F	3F	4F	5F	6F	7F	8F	9F	AF	BF	CF	DF	EF	FF
15	31	/ 47	? 63	O 79	_ 95	o 111	△ 127	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	255

Code Page 860

00 NUL 0	10 16	20 SP 32	30 0 48	40 @ 64	50 P 80	60 ` 96	70 p 112	80 Ç 128	90 É 144	A0 á 160	B0 ⣿ 176	C0 └ 192	D0 ╨ 208	E0 α 224	F0 ≡ 240
01 1	11 XON 17	21 ! 33	31 1 49	41 A 65	51 Q 81	61 a 97	71 q 113	81 ü 129	91 À 145	A1 í 161	B1 ⣿ 177	C1 ┴ 193	D1 ╤ 209	E1 β 225	F1 ± 241
02 2	12 18	22 " 34	32 2 50	42 B 66	52 R 82	62 b 98	72 r 114	82 é 130	92 È 146	A2 ó 162	B2 ⣿ 178	C2 ┬ 194	D2 ╥ 210	E2 Γ 226	F2 ≥ 242
03 3	13 XOFF 19	23 # 35	33 3 51	43 C 67	53 S 83	63 c 99	73 s 115	83 â 131	93 ô 147	A3 ú 163	B3 ⣿ 179	C3 ├ 195	D3 ╙ 211	E3 π 227	F3 ≤ 243
04 4	14 20	24 $ 36	34 4 52	44 D 68	54 T 84	64 d 100	74 t 116	84 ã 132	94 õ 148	A4 ñ 164	B4 ⣿ 180	C4 ─ 196	D4 ╘ 212	E4 Σ 228	F4 ⌠ 244
05 5	15 21	25 % 37	35 5 53	45 E 69	55 U 85	65 e 101	75 u 117	85 à 133	95 ò 149	A5 Ñ 165	B5 ⣿ 181	C5 ┼ 197	D5 ╒ 213	E5 σ 229	F5 ⌡ 245
06 6	16 22	26 & 38	36 6 54	46 F 70	56 V 86	66 f 103	76 v 118	86 Á 134	96 Ú 150	A6 ª 166	B6 ⣿ 182	C6 ╞ 198	D6 ╓ 214	E6 µ 230	F6 ÷ 246
07 7	17 23	27 ' 39	37 7 55	47 G 71	57 W 87	67 g 103	77 w 119	87 ç 135	97 ù 151	A7 º 167	B7 ⣿ 183	C7 ╟ 199	D7 ╫ 215	E7 τ 231	F7 ≈ 247
08 8	18 24	28 (40	38 8 56	48 H 72	58 X 88	68 h 104	78 x 120	88 ê 136	98 Ì 152	A8 ¿ 168	B8 ⣿ 184	C8 ╚ 200	D8 ╪ 216	E8 ϕ 232	F8 ° 248
09 9	19 25	29) 41	39 9 57	49 I 73	59 Y 89	69 i 105	79 y 121	89 Ê 137	99 Õ 153	A9 Ò 169	B9 ⣿ 185	C9 ╔ 201	D9 ┘ 217	E9 Θ 233	F9 • 249
0A LF 10	1A 26	2A * 42	3A : 58	4A J 74	5A Z 90	6A j 106	7A z 122	8A è 138	9A Ü 154	AA ¬ 170	BA ⣿ 186	CA ╩ 202	DA ┌ 218	EA Ω 234	FA · 250
0B 11	1B ESC 27	2B + 43	3B ; 59	4B K 75	5B [91	6B k 107	7B { 123	8B Í 139	9B ¢ 155	AB ½ 171	BB ⣿ 187	CB ╦ 203	DB ⣿ 219	EB δ 235	FB √ 251
0C 12	1C 28	2C , 44	3C < 60	4C L 76	5C \ 92	6C l 108	7C | 124	8C Ô 140	9C £ 156	AC ¼ 172	BC ⣿ 188	CC ╠ 204	DC ▄ 220	EC ∞ 236	FC n 252
0D CR 13	1D GS 29	2D - 45	3D = 61	4D M 77	5D] 93	6D m 109	7D } 125	8D ì 141	9D Ú 157	AD ¡ 173	BD ⣿ 189	CD ═ 205	DD ▌ 221	ED ∅ 237	FD ² 253
0E 14	1E 30	2E . 46	3E > 62	4E N 78	5E ^ 94	6E n 110	7E ~ 126	8E Ã 142	9E Pt 158	AE « 174	BE ⣿ 190	CE ╬ 206	DE ▐ 222	EE ε 238	FE ■ 254
0F 15	1F 31	2F / 47	3F ? 63	4F O 79	5F _ 95	6F o 111	7F SP 127	8F Â 143	9F Ó 159	AF » 175	BF ⣿ 191	CF ╧ 207	DF ▀ 223	EF ∩ 239	FF 255

Code Page 863

00 NUL 0	10 16	20 SP 32	30 0 48	40 @ 64	50 P 80	60 ` 96	70 p 112	80 Ç 128	90 É 144	A0 ¦ 160	B0 ⁞ 176	C0 └ 192	D0 ⊥ 208	E0 α 224	F0 ≡ 240
01 1	11 XON 17	21 ! 33	31 1 49	41 A 65	51 Q 81	61 a 97	71 q 113	81 ü 129	91 È 145	A1 ' 161	B1 ▒ 177	C1 ┴ 193	D1 ╤ 209	E1 β 225	F1 ± 241
02 2	12 18	22 " 34	32 2 50	42 B 66	52 R 82	62 b 98	72 r 114	82 é 130	92 Ê 146	A2 ó 162	B2 ▓ 178	C2 ┬ 194	D2 ╥ 210	E2 Γ 226	F2 ≥ 242
03 3	13 XOFF 19	23 # 35	33 3 51	43 C 67	53 S 83	63 c 99	73 s 115	83 â 131	93 ô 147	A3 ú 163	B3 │ 179	C3 ├ 195	D3 ╙ 211	E3 π 227	F3 ≤ 243
04 4	14 20	24 $ 36	34 4 52	44 D 68	54 T 84	64 d 100	74 t 116	84 Â 132	94 Ë 148	A4 ¨ 164	B4 ┤ 180	C4 ─ 196	D4 ╘ 212	E4 Σ 228	F4 ⌠ 244
05 5	15 21	25 % 37	35 5 53	45 E 69	55 U 85	65 e 101	75 u 117	85 à 133	95 Ï 149	A5 ³ 165	B5 ╡ 181	C5 ┼ 197	D5 ╒ 213	E5 σ 229	F5 ⌡ 245
06 6	16 22	26 & 38	36 6 54	46 F 70	56 V 86	66 f 103	76 v 118	86 ¶ 134	96 û 150	A6 ª 166	B6 ╢ 182	C6 ╞ 198	D6 ╓ 214	E6 µ 230	F6 ÷ 246
07 7	17 23	27 ' 39	37 7 55	47 G 71	57 W 87	67 g 103	77 w 119	87 ç 135	97 ù 151	A7 ¯ 167	B7 ╖ 183	C7 ╟ 199	D7 ╫ 215	E7 τ 231	F7 ≈ 247
08 8	18 24	28 (40	38 8 56	48 H 72	58 X 88	68 h 104	78 x 120	88 ê 136	98 ¤ 152	A8 Î 168	B8 ╕ 184	C8 ╚ 200	D8 ╪ 216	E8 ϕ 232	F8 ° 248
09 9	19 25	29) 41	39 9 57	49 I 73	59 Y 89	69 i 105	79 y 121	89 ë 137	99 ô 153	A9 ⌐ 169	B9 ╣ 185	C9 ╔ 201	D9 ┘ 217	E9 Θ 233	F9 ● 249
0A LF 10	1A 26	2A * 42	3A : 58	4A J 74	5A Z 90	6A j 106	7A z 122	8A è 138	9A Ü 154	AA ¬ 170	BA ║ 186	CA ╩ 202	DA ┌ 218	EA Ω 234	FA • 250
0B 11	1B ESC 27	2B + 43	3B ; 59	4B K 75	5B [91	6B k 107	7B { 123	8B ï 139	9B ¢ 155	AB ½ 171	BB ╗ 187	CB ╦ 203	DB ▉ 219	EB δ 235	FB √ 251
0C 12	1C 28	2C , 44	3C < 60	4C L 76	5C \ 92	6C l 108	7C | 124	8C î 140	9C £ 156	AC ¼ 172	BC ╝ 188	CC ╠ 204	DC ▄ 220	EC ∞ 236	FC n 252
0D CR 13	1D GS 29	2D - 45	3D = 61	4D M 77	5D] 93	6D m 109	7D } 125	8D = 141	9D ù 157	AD ¾ 173	BD ╜ 189	CD ═ 205	DD ▌ 221	ED ∅ 237	FD ² 253
0E 14	1E 30	2E . 46	3E > 62	4E N 78	5E ^ 94	6E n 110	7E ~ 126	8E À 142	9E Û 158	AE « 174	BE ╛ 190	CE ╬ 206	DE ▐ 222	EE ε 238	FE ■ 254
0F 15	1F 31	2F / 47	3F ? 63	4F O 79	5F _ 95	6F o 111	7F SP 127	8F § 143	9F ƒ 159	AF » 175	BF ┐ 191	CF ╧ 207	DF ▀ 223	EF ∩ 239	FF 255

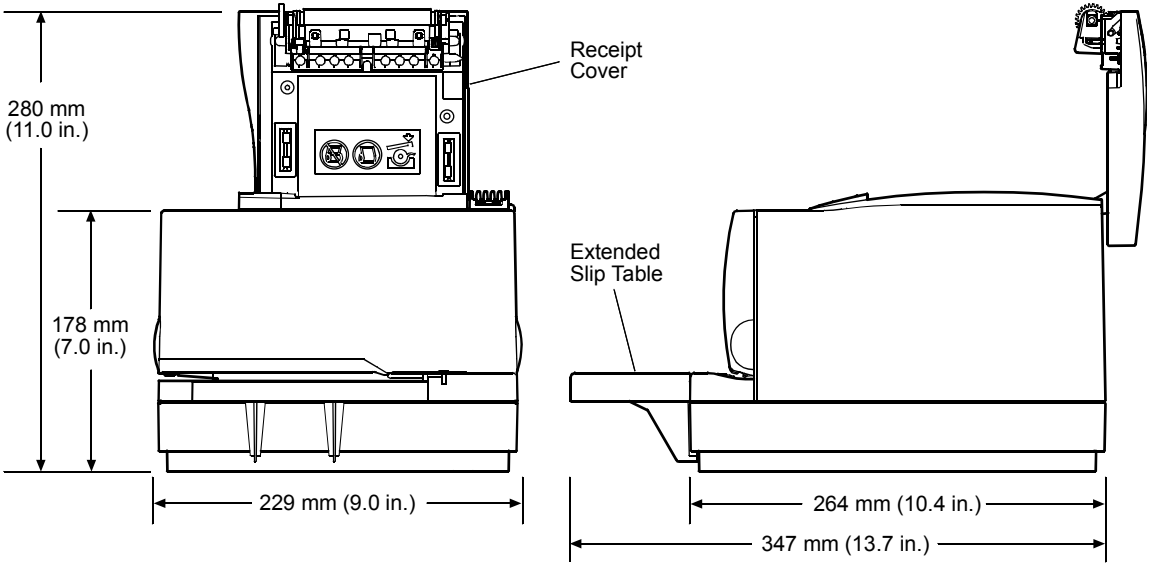
Code Page 865

00 0	10 16	20 32	30 0 48	40 @ 64	50 P 80	60 ` 96	70 p 112	80 Ç 128	90 É 144	A0 á 160	B0 ⁝ 176	C0 └ 192	D0 ⊥ 208	E0 ∝ 224	F0 ≡ 240
01 1	11 17	21 ! 33	31 1 49	41 A 65	51 Q 81	61 a 97	71 q 113	81 ü 129	91 æ 145	A1 í 161	B1 ▒ 177	C1 ┴ 193	D1 ╤ 209	E1 β 225	F1 ± 241
02 2	12 18	22 " 34	32 2 50	42 B 66	52 R 82	62 b 98	72 r 114	82 é 130	92 Æ 146	A2 ó 162	B2 ▓ 178	C2 ┬ 194	D2 ╥ 210	E2 Γ 226	F2 ≥ 242
03 3	13 19	23 # 35	33 3 51	43 C 67	53 S 83	63 c 99	73 s 115	83 â 131	93 ô 147	A3 ú 163	B3 │ 179	C3 ├ 195	D3 ╙ 211	E3 π 227	F3 ≤ 243
04 4	14 20	24 $ 36	34 4 52	44 D 68	54 T 84	64 d 100	74 t 116	84 ä 132	94 ö 148	A4 ñ 164	B4 ┤ 180	C4 ─ 196	D4 ╘ 212	E4 Σ 228	F4 ⌠ 244
05 5	15 21	25 % 37	35 5 53	45 E 69	55 U 85	65 e 101	75 u 117	85 à 133	95 ò 149	A5 Ñ 165	B5 ╡ 181	C5 ┼ 197	D5 ╒ 213	E5 σ 229	F5 ⌡ 245
06 6	16 22	26 & 38	36 6 54	46 F 70	56 V 86	66 f 103	76 v 118	86 å 134	96 û 150	A6 ª 166	B6 ╢ 182	C6 ╞ 198	D6 ╓ 214	E6 µ 230	F6 ÷ 246
07 7	17 23	27 ' 39	37 7 55	47 G 71	57 W 87	67 g 103	77 w 119	87 ç 135	97 ù 151	A7 º 167	B7 ╖ 183	C7 ╟ 199	D7 ╫ 215	E7 τ 231	F7 ≈ 247
08 8	18 24	28 (40	38 8 56	48 H 72	58 X 88	68 h 104	78 x 120	88 ê 136	98 ÿ 152	A8 ¿ 168	B8 ╕ 184	C8 ╚ 200	D8 ╪ 216	E8 ϕ 232	F8 ° 248
09 9	19 25	29) 41	39 9 57	49 I 73	59 Y 89	69 i 105	79 y 121	89 ë 137	99 Ö 153	A9 ⌐ 169	B9 ╣ 185	C9 ╔ 201	D9 ┘ 217	E9 Θ 233	F9 ∙ 249
0A 10	1A 26	2A * 42	3A : 58	4A J 74	5A Z 90	6A j 106	7A z 122	8A è 138	9A Ü 154	AA ¬ 170	BA ║ 186	CA ╩ 202	DA ┌ 218	EA Ω 234	FA · 250
0B 11	1B 27	2B + 43	3B ; 59	4B K 75	5B [91	6B k 107	7B { 123	8B ï 139	9B ø 155	AB ½ 171	BB ╗ 187	CB ╦ 203	DB ▉ 219	EB δ 235	FB √ 251
0C 12	1C 28	2C , 44	3C < 60	4C L 76	5C \ 92	6C l 108	7C | 124	8C î 140	9C £ 156	AC ¼ 172	BC ╝ 188	CC ╠ 204	DC ▄ 220	EC ∞ 236	FC n 252
0D 13	1D 29	2D - 45	3D = 61	4D M 77	5D] 93	6D m 109	7D } 125	8D ì 141	9D Ø 157	AD ¡ 173	BD ╜ 189	CD ═ 205	DD ▌ 221	ED ∅ 237	FD ² 253
0E 14	1E 30	2E . 46	3E > 62	4E N 78	5E ^ 94	6E n 110	7E ~ 126	8E Ä 142	9E Pt 158	AE « 174	BE ╛ 190	CE ╬ 206	DE ▐ 222	EE ε 238	FE ■ 254
0F 15	1F 31	2F / 47	3F ? 63	4F O 79	5F _ 95	6F o 111	7F △ 127	8F Å 143	9F ƒ 159	AF ¤ 175	BF ┐ 191	CF ╧ 207	DF ▀ 223	EF ∩ 239	FF 255

Code Page 866

00 0	10 16	20 32	30 0 48	40 @ 64	50 P 80	60 ` 96	70 p 112	80 А 128	90 Р 144	A0 а 160	B0 ⁝ 176	C0 └ 192	D0 ╨ 208	E0 р 224	F0 Ё 240
01 1	11 17	21 ! 33	31 1 49	41 A 65	51 Q 81	61 a 97	71 q 113	81 Б 129	91 С 145	A1 б 161	B1 ▒ 177	C1 ┴ 193	D1 ╤ 209	E1 с 225	F1 ё 241
02 2	12 18	22 " 34	32 2 50	42 B 66	52 R 82	62 b 98	72 r 114	82 В 130	92 Т 146	A2 в 162	B2 ▓ 178	C2 ┬ 194	D2 ╥ 210	E2 т 226	F2 Є 242
03 3	13 19	23 # 35	33 3 51	43 C 67	53 S 83	63 c 99	73 s 115	83 Г 131	93 У 147	A3 г 163	B3 │ 179	C3 ├ 195	D3 ╙ 211	E3 у 227	F3 є 243
04 4	14 20	24 $ 36	34 4 52	44 D 68	54 T 84	64 d 100	74 t 116	84 Д 132	94 Ф 148	A4 д 164	B4 ┤ 180	C4 ─ 196	D4 ╘ 212	E4 ф 228	F4 Ї 244
05 5	15 21	25 % 37	35 5 53	45 E 69	55 U 85	65 e 101	75 u 117	85 Е 133	95 Х 149	A5 е 165	B5 ╡ 181	C5 ┼ 197	D5 ╒ 213	E5 х 229	F5 ї 245
06 6	16 22	26 & 38	36 6 54	46 F 70	56 V 86	66 f 103	76 v 118	86 Ж 134	96 Ц 150	A6 ж 166	B6 ╢ 182	C6 ╞ 198	D6 ╓ 214	E6 ц 230	F6 Ў 246
07 7	17 23	27 ' 39	37 7 55	47 G 71	57 W 87	67 g 103	77 w 119	87 З 135	97 Ч 151	A7 з 167	B7 ╖ 183	C7 ╟ 199	D7 ╫ 215	E7 ч 231	F7 ў 247
08 8	18 24	28 (40	38 8 56	48 H 72	58 X 88	68 h 104	78 x 120	88 И 136	98 Ш 152	A8 и 168	B8 ╕ 184	C8 ╚ 200	D8 ╪ 216	E8 ш 232	F8 ° 248
09 9	19 25	29) 41	39 9 57	49 I 73	59 Y 89	69 i 105	79 y 121	89 Й 137	99 Щ 153	A9 й 169	B9 ╣ 185	C9 ╔ 201	D9 ┘ 217	E9 щ 233	F9 ∙ 249
0A 10	1A 26	2A * 42	3A : 58	4A J 74	5A Z 90	6A j 106	7A z 122	8A К 138	9A Ъ 154	AA к 170	BA ║ 186	CA ╩ 202	DA ┌ 218	EA ъ 234	FA · 250
0B 11	1B 27	2B + 43	3B ; 59	4B K 75	5B [91	6B k 107	7B { 123	8B Л 139	9B Ы 155	AB л 171	BB ╗ 187	CB ╦ 203	DB ▉ 219	EB ы 235	FB √ 251
0C 12	1C 28	2C , 44	3C < 60	4C L 76	5C \ 92	6C l 108	7C | 124	8C М 140	9C Ь 156	AC м 172	BC ╝ 188	CC ╠ 204	DC ▄ 220	EC ь 236	FC № 252
0D 13	1D 29	2D - 45	3D = 61	4D M 77	5D] 93	6D m 109	7D } 125	8D Н 141	9D Э 157	AD н 173	BD ╜ 189	CD ═ 205	DD ▌ 221	ED э 237	FD ¤ 253
0E 14	1E 30	2E . 46	3E > 62	4E N 78	5E ^ 94	6E n 110	7E ~ 126	8E О 142	9E Ю 158	AE о 174	BE ╛ 190	CE ╬ 206	DE ▐ 222	EE ю 238	FE ■ 254
0F 15	1F 31	2F / 47	3F ? 63	4F O 79	5F _ 95	6F o 111	7F △ 127	8F П 143	9F Я 159	AF п 175	BF ┐ 191	CF ╧ 207	DF ▀ 223	EF я 239	FF 255

Dimensions and Weight



Height	178 mm (7.0 inches)
Height with Cover Open	280 mm (11.0 inches)
Width	229 mm (9.0 inches)
Depth	264 mm (10.4 inches)
Depth with Extended Slip Table	347 mm (13.7 inches)
Weight	4.3 kg (9.4 lbs.), Non-MICR 4.4 kg (9.6 lbs.), MICR and Extended Slip Table 4.9 kg (10.8 lbs.), MICR and Check Flip

Chapter 6: Communication Interface

Communication Overview

In order for the printer to communicate with the host, a communication link must be set up. The 7158 printer supports either the RS-232C or USB interfaces.

The RS-232C interface has a protocol associated with it that the host must understand and adhere to. Only when the interface parameters match and the proper protocol are used will the host and the printer be able to communicate.

Once the communication link is established, commands can be sent to the printer. This section describes how to send commands to the printer using DOS and BASIC. This section does not take into account the necessary protocol, but is meant as a general introduction to how the printer functions.

Using DOS to Send Commands

One way of getting commands to the printer is to send them directly from DOS. Use the following DOS command do this.

```
COPY CON: COM1:
```

This sets the computer up so the hexadecimal code corresponding to any key pressed is sent to the communication port COM1 when the COPY mode is exited. If the printer is connected to COM1, then the data will go to the printer.

Exit the COPY mode by typing:

```
CTRL Z [Enter]
```

Software programs can now write data to the COM1 device.

Using BASIC to Send Commands

In BASIC, printer commands are sent as a string of characters preceded by the LPRINT command. For example:

```
LPRINT CHR$(&H0A)
```

Sends the hexadecimal number 0A to the printer, which causes the printer to print the contents of its print buffer. Commands sent prior to 0A tell the printer exactly how data should appear on the paper. For example:

```
LPRINT CHR$(&H12); "ABC"; CHR$(&H0A)
```

Sends the hexadecimal numbers 12 41 42 43 0A to the printer. This causes the printer to set itself to double wide mode (12), load the print buffer with "ABC" (41 42 43), and finally, print (0A). Again, the communication link that the BASIC program configures to must be matched to that of the printer.

RS-232C Interface

The RS-232C interface uses either the XON/XOFF (software) or DTR/DSR (hardware) protocol to control the flow of information between the computer and the printer. For XON/XOFF, a particular character is sent back and forth between the host and the printer to regulate the communication. For DTR/DSR, changes in the DTR/DSR signal on the RS 232 interface coordinate the information flow.

The RS-232C interface offers standard settings that are selected with the Configuration Menu. Use of the Configuration Menu is described in "Configuring the Printer" in this manual.

Print Speed and Timing

The fast speed of the printer requires the application to send data to the printer at least as fast as it is printed. The application must also allow output lines to be buffered ahead at the printer, so the printer will be able to print each line immediately after the preceding line, without stopping to wait for more data. Ideally, the application will send all the data for an entire receipt or slip without pausing between characters or lines transmitted.

If the application sends data at 9600 baud and pauses between lines for as short a time as 50 milliseconds, the printer will never be able to print at full speed. However, if the application sends data at 19.2 K baud and does not pause between lines, the printer will be able to print at its full speed of 2400 lines/minute. The table below shows that with a pause of 50 milliseconds after each line, the transmit time equals or exceeds the printer process time, slowing down the printer, regardless of the baud rate.

50ms Pause after Each Line

Characters/Line	Lines/Receipt	Transmit Time (19.2 K Baud)	Process Time*
20	20	1.2 Seconds	0.5 Seconds
20	40	2.4 Seconds	1.0 Seconds
44	20	1.44 Seconds	0.5 Seconds
44	40	2.88 Seconds	1.0 Seconds

* Process Time is the time it would take the printer to process the data if all transmitted data was present. (It is not the time it takes to print the receipt.)

Example: 20 characters/line, with 20 lines = 0.5 seconds process time for the printer. It takes 1.2 seconds to send the data to the printer at 19.2K-baud speed with a 50ms delay after each line. Thus the printer would have to wait 0.7 seconds longer to receive the data than it could process it if no delays existed and the transmission speed were faster.

The next table shows that with no delay between lines, the transmit time is much less than the process time, allowing the printer to print at full speed.

No Delay after Each Line

Characters/Line	Lines/Receipt	Transmit Time (19.2 K Baud)	Process Time*
20	20	0.2 Seconds	0.5 Seconds
20	40	0.4 Seconds	1.0 Seconds
44	20	0.44 Seconds	0.5 Seconds
44	40	0.88 Seconds	1.0 Seconds

RS-232C Communications

The 7158 offers an industry standard RS-232C serial point-to-point interface, with options available to the user.

Options that may be set through the Configuration Menu are:

- The baud rate of 115200, 57600, 38400, 19200, 9600, 4800, 2400, or 1200 baud
- The number of data bits to seven or eight
- The number of stop bits to one or two
- Enable or disable parity
- The flow control to software (XON/XOFF) or Hardware (DTR/DSR)
- Set the printer to ignore data errors or print a "?" upon encountering an error

RS-232C Interface Timing

Receiving data, DTR/DSR or XON/XOFF selected:

[DTR MARK] - Between power on and ready to accept data.

- In an error state.

- Remaining space in the 4K buffer falls below 256 bytes. *

[DTR SPACE] - When ready to accept data.

- Remaining space in the 4K buffer rises above 512 bytes. **

[XON sent] - When ready to accept data after power on.

- Remaining space in the 4K buffer rises above 512 bytes. **

[XOFF sent] - In an error state.

- Remaining space in the 4K buffer falls below 256 bytes*

* - 10 bytes in line mode.

** - 20 bytes in line mode.

Sending data (status):

In DTR/DSR mode, data is sent only when DSR is SPACE.

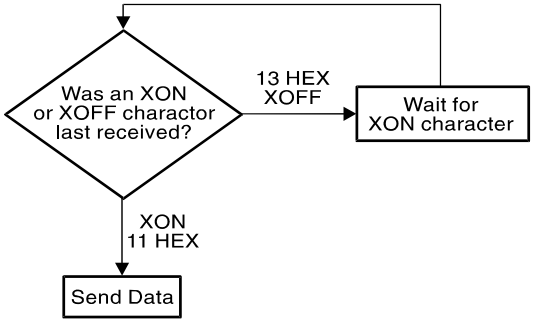
In XON/XOFF mode, DSR state is ignored.

XON/XOFF Protocol

The XON/XOFF characters coordinate the information transfer between the printer and the host computer. The printer sends an XON character when it is ready to receive data and it sends an XOFF character when it cannot accept any more data. The software on the host computer must monitor the communication link as shown in the following flowchart in order to send data at the appropriate times.

If XON/XOFF has been selected, the printer also toggles the DTR signal, as described in the next section, but it does not look at the DSR signal to transmit data.

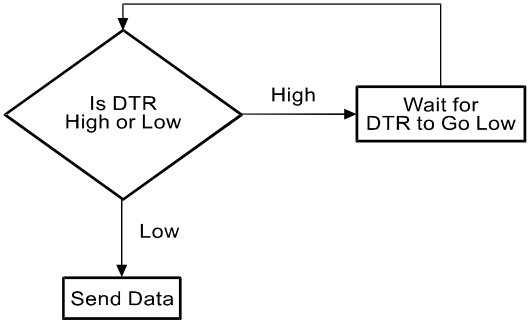
Host Flow Control Diagram



XON character = hexadecimal 11.
XOFF character = hexadecimal 13.

DTR/DSR Protocol

The DTR signal is used to control data transmission to and from the printer. It is driven low when the printer is ready to receive data and driven high when it cannot accept any more data. Data is transmitted from the printer after it confirms that the DSR signal is low.



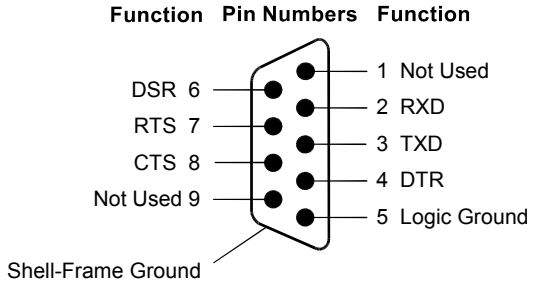
Connector Pin-outs

This section describes the pin settings for the connectors on the back of the printer.

Communication Connectors

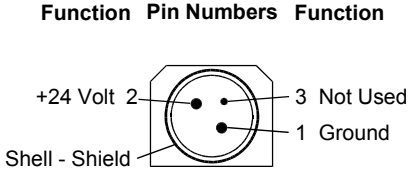
The following illustrations show the RS-232C communication connectors and pin assignments. The connectors are located at the rear of the printer, and are specified as: male DB9, 9-pin or female DB-25, 25 pin D-shell, with RTS and CTS pins connected.

9-pin DB-9 Connector



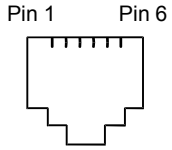
Power Connector

With RS-232C, the printer is always remotely powered. The following illustration shows the power cable connector and pin assignments. The power cable connector is a 3-pin plug and is located at the rear of the printer.



Cash Drawer Connector

A 6-contact modular jack (RJ11) is available to drive a cash drawer with dedicated feedback, or up to two cash drawers without feedback. The following illustration shows the pinouts for the cash drawer connector.



The following table shows the pinouts for the cash drawer. The connector can support two cash drawers with a Y cable, and is located at the rear of the printer.

Pin Number	Cash Drawer Connector
1	Frame Ground
2	Drawer 1 Solenoid
3	Drawer 1 Status Switch
4	+24 Volts (to Solenoid +)
5	Drawer 2 Solenoid
6	Ground (Status Switch Return)

The maximum current supplied is 2.0 Amps, and the pulse width is programmable from 50 to 300 milliseconds.

Chapter 7: Programming Guide

Command Conventions

The following information describes how each command is organized:

Name: Name of command.

ASCII: The ASCII control code.

Hexadecimal: The Hexadecimal control code.

Decimal: The Decimal control code.

Value: A description of the command operands.

Range: The upper and lower limits of the command operand.

Default: The command operand default after printer reset.

Description: Brief description and summary of the command.

Formulas: Any formulas used for this command.

Exceptions: Describes any exceptions to this command, i.e.: incompatible commands.

Related Information: Describes related information for this command, i.e.: bit information.

List of Commands and Location

Commands control all operations and functions of the printer. This includes selecting the size and placement of characters and graphics on the receipt or the slip and feeding and cutting the paper. Any of the commands may be used in any combination to program a host computer to communicate with the printer (unless otherwise noted).

Some commands listed and described here may not be implemented. They will be identified as "not implemented". If received, they are ignored and not sent to the print buffer as data. Any non-legal commands are sent to the print buffer as data.

By Command Code

All items in **BOLD** are new or have additional functionality when compared to the 7156.

Code (Hexadecimal)	Command	Page
09 (HT)	Horizontal Tab	45
0A (LF)	Print and Feed Paper One Line	36
0C (FF)	**Print and Return to Standard Mode**	**120**
0C (FF)	Print and Eject Slip	36
0D (CR)	Print and Carriage Return	37
10	Clear Printer	22
10 04 n	Real Time Status Transmission (DLE Sequence)	103
10 05 n	Real Time Request to Printer (GS Sequence)	107
11	Close Form	23
12	Select Double-Wide Characters	53
13	Select Single-Wide Characters	53
14 *n*	Feed *n* Print Lines	37
15 *n*	Feed *n* Dot Rows	38

Code (Hexadecimal)	Command	Page
16 *n*	Add *n* Extra Dot Rows	39
17	Print	40
18	Open Form	23
18	**Cancel Print Data in Page Mode**	**121**
19	Perform Full Knife Cut	24
1A	Perform Partial Knife Cut	24
1B followed by the BMP file data characters	**Download BMP Logo**	**74**
1B 07	Generate Tone	24
1B 0C	**Print Data in Page Mode**	**121**
1B 12	Select 90 Degree Counter-Clockwise Rotated Print	54
1B 14 *n*	Set Column	45
1B 16 *n*	Select Pitch (Column Width)	55
1B 20 *n*	Set Character Right-Side Spacing	56
1B 21 *n*	Select Print Modes	57
1B 24 *n1 n2*	Set Absolute Starting Position	46
1B 25 *n*	Select or Cancel User-Defined Character Set	58
1B 26 3 *c1 c2…dn*	Define User-Defined Characters	59
1B 27 *m a0 a1 a2 d1 … dm*	Write to User Data Storage	146
1B 2A *m n1 n2* *d1 … dn*	Select Bit Image Mode	75
1B 2D *n*	**Select or Cancel Underline Mode**	**62**
1B 32	Set Line Spacing to 1/6 Inch	40
1B 33 *n*	Set Line Spacing	41

Code (Hexadecimal)	Command	Page
1B 34 m a0 a1 a2	Read from User Data Storage	147
1B 3A 30 30 30	Copy Character Set from ROM to RAM	62
1B 3C	Return Home	25
1B 3D *n*	Select Peripheral Device (For Multi-Drop)	25
1B 3F n	Cancel User-defined Characters	63
1B 40	Initialize Printer	26
1B 43 *n*	Set Slip Paper Eject Length	26
1B 44 [*n*] *k 00*	Set Horizontal Tabs	47
1B 45 *n*	Select or Cancel Emphasized Mode	63
1B 47	Select Double Strike (A756 Emulation)	64
1B 48	Cancel Double Strike	64
1B 49 n	**Set or Cancel Italic Print**	**65**
1B 4A *n*	Print and Feed Paper	42
1B 4B *n*	Print and Reverse Feed Paper	42
1B 4C	**Select Page Mode**	**122**
1B 4C n1 n2 d1…dn	Select Double Density Graphics (A756 Emulation)	78
1B 52 *n*	**Select International Character Set**	**66**
1B 53	**Select Standard Mode**	**123**
1B 54 *n*	**Select Print Direction in Page Mode**	**124**
1B 55 *n*	Select or Cancel Unidirectional Printing Mode	67
1B 56 *n*	Select or Cancel 90 Degrees Clockwise Rotated	67
1B 57 *n1, n2,...n8*	**Set Printing Area in Page Mode**	**125**
1B 59 n1 n2 d1…dn	Select Double Density Graphics	78
1B 5B 7D	Switch to Flash Download Mode	151
1B 5C *n1 n2*	Set Relative Print Position	48
1B 61 *n*	Select Justification	50
1B 63 30 *n*	Select Receipt or Slip for Printing; Slip	26

Code (Hexadecimal)	Command	Page
	for MICR Read	
1B 63 31 *n*	Select Receipt or Slip for Setting Line Spacing	28
1B 63 33 *n*	**Select Paper Sensors to Output Paper End Signals (Parallel Only)**	**29**
1B 63 34 *n*	Select Sensors to Stop Printing	30
1B 63 35 *n*	Enable or Disable Panel Buttons	30
1B 63 36 *n*	Enable or Disable Online Switch	31
1B 64 *n*	Print and Feed *n* Lines	43
1B 65 *n*	Print and Reverse Feed *n* Lines	43
1B 66 *m n*	Set Slip Paper Waiting Time	31
1B 69	Perform Full Knife Cut	24
1B 6A *k*	Read from Non-Volatile Memory	147
1B 6D	Perform Partial Cut	24
1B 70 *n p1 p2*	Generate Pulse to Open Cash Drawer	32
1B 73 *n1 n2 k*	Write to Non-Volatile Memory (NVRAM)	147
1B 74 n	**Select International Character Set**	**66**
1B 75 0	Transmit Peripheral Device Status	86
1B 75 *n*	Request Alternate Status	87
1B 76	Transmit Paper Sensor Status	88
1B 77 01	Read MICR Data and Transmit	131
1B 77 46	**Check Flip**	**146**
1B 77 50	Define Parsing Format, Save in NVRAM	132
1B 77 52	Reread MICR Data	131
1B 77 70	Define Parsing Format, Do Not Save Permanently	132
1B 7A *n*	Select or Cancel Parallel Printing Mode on R&J	32
1B 7B n	Select or Cancel Upside Down Printing Mode	68
1C	Select Slip Station	33

Code (Hexadecimal)	Command	Page
1D 00	Request Printer ID	152
1D 01	Return Segment Number Status of Flash Memory	152
1D 02 *n*	Select Flash Memory Sector to Download	153
1D 03 *n*	Real Time Request to Printer (DLE Sequence)	107
1D 04 *n*	Real Time Status Transmission (GS Sequence)	103
1D 05	Real Time Printer Status Transmission	109
1D 06	Get Firmware CRC	153
1D 07	Return Microprocessor CRC	154
1D 0E	Erase the Flash Memory	154
1D 0F	Return Main Program Flash CRC	154
1D 10 *n*	Erase Selected Flash Sector	155
1D 11 *al ah cl ch d1…dn*	Download to Active Flash Sector	156
1D 14 *n*	Reverse Feed *n* Lines	43
1D 15 *n*	Reverse Feed *n* Dots	44
1D 21 *n*	**Select Character Size**	**69**
1D 22 *n*	Select Memory Type (SRAM/Flash) Where to Save Logos or User-Defined Fonts	148
1D 22 55 *n1 n2*	**Flash Allocation**	**149**
1D 23 n	Select the Current Logo (Downloaded Bit Image)	79
1D 24 *nL nH*	**Set Absolute Vertical Print Position in Page Mode**	**127**
1D 2A *n1 n2 d1…d*n]	Define Downloaded Bit Image	81
1D 2F *m*	Print Downloaded Bit Image	83
1D 3A	**Start or End Macro Definition**	**129**
1D 40 *n*	Erase User Flash Sector	150
1D 42 *n*	**Select or Cancel White/Black Reverse Print Mode**	**71**

Code (Hexadecimal)	Command	Page
1D 48 *n*	Select Printing Position for HRI Characters	114
1D 49 *n*	Transmit Printer ID	89
1D 49 40 *n*	Transmit Printer ID, Remote Diagnostics Extension	91
1D 4C *nL nH*	Set Left Margin	51
1D 50 *x y*	Set Horizontal and Vertical Minimum Motion Units	44
1D 56 *m*	Select Cut Mode and Cut Paper	34
1D 56 *m n*	Select Cut Mode and Cut Paper	34
1D 57 *nL nH*	Set Printing Area Width	52
1D 5C *nL nH*	**Set Relative Vertical Print Position in Page Mode**	**128**
1D 5E *r t m*	**Execute Macro**	**130**
1D 61 *n*	Select or Cancel Automatic Status Back	110
1D 66 *n*	Select Pitch for HRI Characters	115
1D 68 *n*	Select Bar Code Height	115
1D 6B *m d1...*	**Print Bar Code**	**115**
1D 6B *m n d1…dn*	Print Bar Code	115
1D 72 *n*	Transmit Status	96
1D 77 *n*	Select Bar Code Width	119
1D FF	Reboot Printer	157
1E	Select Receipt Station	35
1F 04 *n*	**Convert 6 Dots/mm Bitmap to 8 Dots/mm Bitmap**	**84**
1F 05 n	**Select Superscript or Subscript Modes**	**72**
1F 74	**Print Test Form**	**35**

By Function

All items in **BOLD** are new or have additional functionality when compared to the 7156.

Printer Function Commands

Code (Hexadecimal	Command	Page
10	Clear Printer	22
11	Close Form	23
18	Open Form	23
19	Perform Full Knife Cut	24
1A	Perform Partial Knife Cut	24
1B 07	Generate Tone	24
1B 3C	Return Home	25
1B 3D	Select Peripheral Device (for Multi-Drop)	25
1B 40	Initialize Printer	26
1B 43 n	Set Slip Paper Eject Length	26
1B 63 30 n	Select Receipt or Slip for Printing; Slip for MICR Read	26
1B 63 31 n	Select Receipt or Slip for Setting Line Spacing	28
1B 63 33 n	**Select Paper Sensors to Output Paper End Signals (Parallel Only)**	**29**
1B 63 34 n	Select Sensors to Stop Printing	30
1B 63 35 n	Enable or Disable Panel Buttons	30
1B 63 36 n	Enable or Disable Online Switch	31
1B 66 m n	Set Slip Paper Waiting Time	31
1B 69	Perform Full Knife Cut	24
1B 6D	Perform Partial Knife Cut	24
1B 70 n p1 p2	Generate Pulse to Open Cash Drawer	32

1B 7A n	Select or Cancel Parallel Printing Mode on R&J	32
1C	Select Slip Station	33
1D 56 m	Select Cut Mode and Cut Paper	34
1D 56 m n	Select Cut Mode and Cut Paper	34
1E	Select Receipt Station	35
1F 74	**Print Test Form**	**35**

Vertical Positioning and Print Commands

Code (Hexadecimal	Command	Page
0A	Print and Feed Paper One Line	36
0C	Print and Return to Standard Mode/Print and Eject Slip	36
0D	Print and Carriage Return	37
14 n	Feed *n* Print Lines	37
15 n	Feed *n* Dot Rows	38
16 n	Add *n* Extra Dot Rows	39
17	Print	40
1B 32	Set Line Spacing to 1/6 Inch	40
1B 33 n	Set Line Spacing	41
1B 4A n	Print and Feed Paper	42
1B 4B n	Print and Reverse Feed Paper	43
1B 64 n	Print and Feed *n* Lines	43
1B 65 n	Print and Reverse Feed *n* Lines	43
1D 14 n	Reverse Feed n Lines	43
1D 15 n	Reverse Feed n Dots	44
1D 50 x y	Set Horizontal and Vertical Minimum Motion Units	44

Horizontal Positioning Commands

Code (Hexadecimal	Command	Page
09	Horizontal Tab	45
1B 14 n	Set Column	45
1B 24 n1 n2	Set Absolute Starting Position	46
1B 44 [n] k 00	Set Horizontal Tabs	47
1B 5C n1 n2	Set Relative Print Position	48
1B 61 n	Select Justification	50
1D 4C nL nH	Set Left Margin	51
1D 57 nL nH	Set Printing Area Width	52

Print Characteristic Commands

Code (Hexadecimal	Command	Page
12	Select Double-Wide Characters	53
13	Select Single-Wide Characters	53
1B 12	Select 90 Degree Counter-Clockwise Rotated Print	54
1B 16 n	Select Pitch (Column Width)	55
1B 20 n	Set Character Right-Side Spacing	56
1B 21 n	Select Print Modes	57
1B 25 n	Select or Cancel User-Defined Character Set	58
1B 26 s c1 c2 d1…dn	Define User-Defined Characters	59
1B 2D n	**Select or Cancel Underline Mode**	**62**
1B 3A 30 30 30	Copy Character Set from ROM to RAM	62
1B 3F n	Cancel User-Defined Characters	63
1B 45 n	Select or Cancel Emphasized Mode	63
1B 47	Select Double Strike (A756 Emulation Mode)	64
1B 47 n	Select Double Strike (A758 Native Mode)	64
1B 48	Cancel Double Strike	64
1B 49 n	**Select or Cancel Italic Print**	**65**
1B 52 n	**Select International Character Set**	**66**
1B 55 n	Select or Cancel Unidirectional Printing Mode	67
1B 56 n	Select or Cancel 90 Degrees Clockwise Rotated Print	67
1B 74 n	Select International Character Set	66
1B 7B n	Select or Cancel Upside Down Printing Mode	68
1D 21 n	**Select Character Size**	**69**
1D 42 n	**Select or Cancel White/Black Reverse Print Mode**	**71**
1F 05 n	**Select Superscript or Subscript Modes**	**72**

Graphics Commands

Code (Hexadecimal	Command	Page
1B followed by the BMP file data characters	Download BMP Logo	74
1B 2A m n1 n2 d1…dn	Select Bit Image Mode	75
1B 4C n1 n2 d1…dn	Select Double-Density Graphics (in A756 Emulation Mode)	78
1B 59 n1 n2 d1…dn	Select Double-Density Graphics	78
1D 23 n	Select Current Logo (Downloaded Bit Image)	79
1D 2A n1 n2 d1…dn]	Define Downloaded Bit Image	81
1D 2F m	Print Downloaded Bit Image	83
1F 04 n	Convert 6 Dots/mm Bitmap to 8 Dots/mm Bitmap	84

Status Commands

Batch Mode

Code (Hexadecimal	Command	Page
1B 75 0	Transmit Peripheral Device Status	86
1B 75 n	Request Alternate Status	87
1B 76	Transmit Paper Sensor Status	88
1D 49 n	Transmit Printer ID	89
1D 49 40 n	Transmit Printer ID, Remote Diagnostics Extension	91
1D 72 n	Transmit Status	96

Real Time

Code (Hexadecimal	Command	Page
10 04 n	Real Time Status Transmission (DLE Sequence)	103
10 05 n	Real Time Request to Printer (GS Sequence)	107
1D 03 n	Real Time Request to Printer (DLE Sequence)	107
1D 04 n	Real Time Status Transmission (GS Sequence)	103
1D 05	Real Time Printer Status Transmission	109

Auto Status Back

Code (Hexadecimal	Command	Page
1D 61 n	Select or Cancel Auto Status Back	110

Barcode Commands

Code (Hexadecimal	Command	Page
1D 48 n	Select Printing Position for HRI Characters	114
1D 66 n	Select Pitch for HRI Characters	115
1D 68 n	Select Bar Code Height	115
1D 6B m d1…dk 00 **or** **1D 6B m n d1…dn**	**Print Bar Code**	**115**
1D 77 n	Select Bar Code Width	119

Page Mode Commands

Code (Hexadecimal	Command	Page
0C	Print and Return to Standard Mode/Print and Eject Slip	120
18	Cancel Print Data in Page Mode	121
1B 0C	Print Data in Page Mode	121
1B 4C	Select Page Mode	122
1B 53	Select Standard Mode	123
1B 54 n	Select Print Direction in Page Mode	124
1B 57 n1, n2…n8]	Set printing Area in Page Mode	125
1D 24 nL nH	Set Absolute Vertical Print Position in Page Mode	127
1D 5C nL nH	Set Relative Vertical Print Position in Page Mode	128

Macro Commands

Code (Hexadecimal	Command	Page
1D 3A	**Start or End Macro Definition**	**129**
1D 5E r t m	**Execute Macro**	**130**

MICR Check Reader Commands

MICR Reading

Code (Hexadecimal	Command	Page
1B 77 01	Read MICR Data and Transmit	131
1B 77 52	Reread MICR Data	131

MICR Parsing

Code (Hexadecimal	Command	Page
1B 77 50	Define Parsing Format, Save in NVRAM	132
1B 77 70	Define Parsing Format, Do Not Save Permanently	132

Check Flip Commands

Code (Hexadecimal	Command	Page
1B 77 46	**Check Flip Command**	**146**

User Data Storage Commands

Code (Hexadecimal	Command	Page
1B 27 m addr d1…dm	Write to User Data Storage	146
1B 34 m addr	Read from User Data Storage	147
1B 6A k	Read from Non-Volatile Memory	147
1B 73 n1 n2 k	Write to Non-Volatile Memory (NVRAM)	147
1D 22 n	Select Memory Type (SRAM/Flash) Where to Save Logos or User-Defined Fonts	148
1D 22 55 n1 n2	**Flash Allocation**	**149**
1D 40 n	Erase User Flash Sector	150

Flash Download Commands

Code (Hexadecimal	Command	Page
1B 5B 7D	Switch Flash Download Mode	151
1D 00	Request Printer ID	152
1D 01	Return Segment Number Status of Flash Memory	152
1D 02 n	Select Flash Memory Sector to Download	153
1D 06	Get Firmware	153
1D 07	Return Microprocessor CRC	154
1D 0E	Erase the Flash Memory	154
1D 0F	Return Main Program Flash CRC	154
1D 10 n	Erase Selected Flash Sector	155
1D 11 aL aH cL cH d1…dn	Download to Active Flash Sector	156
1D FF	Reboot the Printer	157

Comparison to 7156

New Features

There are a number of new firmware features in the A758 Native Mode. These include:

1. Page Mode on the receipt
2. Additional Code pages
3. Additional character attributes
4. Flip
5. More flexible handling of User-defined Characters and Logos (Downloadable Bit Image)
6. Higher baud rates
7. 8 High graphics on slip
8. Macro capabilities
9. Additional remote diagnostics

Page Mode on the receipt

Normally the printer will print data as it is sent. In Page Mode, the data to be printed is composed on a page before printing. This composition process gives the application developer the ability to mix text, graphics and barcodes in different orientations and locations. Once the page composition process is completed, the page is printed. See the Page Mode commands in this section.

Additional Code pages

The 7158 includes support for the additional Code pages: CP852, CP858, CP860, CP863, CP865 and CP866.

Additional character attributes

The 7158 includes support for additional character attributes including Bold, Italics, Underline, Black/White Reverse Print, Superscript, Subscript, and Scaling.

Flip

The 7158 can flip a check on command.

Additional flexibility when using User-defined Characters and Logos (Downloadable Bit Image)

The 7158 can process User-defined Characters and Logos simultaneously. These items are stored in FLASH or SRAM, depending on the application developer's preferences.

Barcodes

The 7158 supports printing of one-dimensional barcodes on the slip station. The receipt station supports ladder barcodes and the addition of Code 93 and PDF417.

FLASH Memory Allocation

The application developer has the ability to determine how the FLASH Memory is allocated between the User Data Storage and Logos/User-defined Characters.

Higher Baud Rate

The 7158 now supports serial communication rates of 57,600 and 115,200.

8 Dot High Graphics on Slip

In A758 Native Mode, the slip supports graphics that are 8 dots high. In A756 Emulation Mode, the graphics are 7 dots high.

Macro Capability

The 7158 supports the ability to record and execute a series of commands called a macro.

Additional Remote Diagnostics

The 7158 supports 5 additional remote diagnostics.

- Number of Flash cycles
- Number of knife jams
- Numbers of cover openings
- Maximum thermal printhead temperature
- Number of slip lines printed

Comparison Chart

The following table details the list of commands whose behavior differs from the 7156 because of the physical differences of a 6 dots/mm head (7156) versus an 8 dots/mm head (7158).

Command	Description	Difference between 7156 and 7158 configured inA 756 Emulation Mode.
15 *n*	Feed *n* Dot Rows	This command will move the paper on the receipt in n/203 inch steps instead of n/152 inch steps.
16 *n*	Add *n* Extra Dot Rows	The dot rows will be measured in n/203 inches versus n/152 inches.
1B 20 *n*	Set Right-Side Character Spacing	This command sets the right side spacing to "n" horizontal motion units. By default, these units are in terms of 1/203 inches versus 1/152 inches.
1B 24 *n1 n2*	Set Absolute Starting Position	For graphics commands, the position is scaled to best match the previous product. In text mode, the equivalent character position is calculated.
1B 26 *s c1 c2 n1 d1...nn dn*]	Define User-Defined Character Set	Since the dots on the new printhead are smaller, user-defined characters that were used on the previous printer will appear smaller on the new printer.
1B 2A *m n1 n2 d1...dn*	Select Bit Image Mode	In A756 Emulation Mode, graphics are scaled to best match the size of the graphic in the previous printer.
1B 33 *n*	Set Line Spacing	This command uses *n* in terms of n/360 inches. Since the previous product had a fundamental step of 1/180 inch and the new product has a fundamental step of 1/203 inch, the actual line spacing will not exactly match the requested spacing.
1B 4A *n*	Print and Feed Paper	(Same as above)
1B 59 *n1 n2 d1...dn*	Select Double-Density	In A756 Emulation Mode, the printer

Command	Description	Difference between 7156 and 7158 configured inA 756 Emulation Mode.
	Graphics	scales the graphics to provide the best match.
1B 5C *n1 n2*	Set Relative Print Position	The parameter to this command is in units of dots. However, the command moves and aligns to character positions. In A756 Emulation Mode, this command calculates how many character positions to move based on the previous product's character width in dots (10) versus the current product (13).
1B 61 *n*	Select Justification	This command does true dot resolution alignment for centering versus character-aligned centering.
1D 2A *n1 n2 d1...dn*]	Define Downloaded Bit Image	In A756 Emulation Mode, this command scales the incoming data to provide a best match to the size of the image as it printed on the previous product.
1D 2F *m*	Print Downloaded Bit Image	(Same as above)

Command Descriptions

Printer Function Commands

The printer function commands control the following basic printer functions and are described in order of their hexadecimal codes:

1. Station Select
2. Platen Control
3. Resetting the printer
4. Cutting the paper
5. Opening the cash drawers

Clear Printer

ASCII: DLE
Hexadecimal: 10
Decimal: 16

Clears the print line buffer without printing and sets the printer to the following condition:

1. Receipt station is selected
2. Double-Wide command (0x12) is cancelled
3. Line Spacing, Pitch, and User-Defined Character Sets are maintained at current selections (RAM is not affected)
4. Single-Wide, Single-High, Non-Rotated, and Left-Aligned characters are set
5. Printer is restarted and error status is cleared in a fault condition
6. Printing position is set to column one
7. Slip platen is opened
8. Slip printhead is homed
9. Knife is homed

Exceptions:

In printers with the Parallel interface, this command also returns paper exhaust to the paper status line if an alternate status has been requested. A DLE command followed by an 04 or 05 is interpreted as a "real time command".
(See Real Time commands)

Close Form

ASCII: DC1
Hexadecimal: 11
Decimal: 17

Closes the feed roller and platen (forms compensation arm assembly) and retracts the forms arm stop unconditionally. If the printer is reset or the Clear (0x10) is received, the feed roller and platen are opened.

This command executes if the platen is already closed. This command is processed regardless of which station is selected.

Open Form

ASCII: CAN
Hexadecimal: 18
Decimal: 24

When the printer is in A756 Emulation Mode or in 7158 (Native) non-Page Mode, this command opens the feed roller and platen (forms compensation arm assembly) so that a form may be inserted (default position).

This command has the same code as the Cancel Print Data in Page Mode command, which is only executed in Page Mode.

This command executes if the platen is already open. This command is processed regardless of which station is selected.

Perform Full Knife Cut

ASCII: EM or ESC i
Hexadecimal: 19 or 1B 69
Decimal: 25 or 27 105

Cuts the receipt, leaving .20 inch (5 mm) of paper. This command is implemented the same as Partial Knife Cut (1A, 1B 6D). There are two codes for this command. Both codes perform the same function.

Line Feed is executed first if print buffer is not empty.

This command is processed regardless of which station is selected.

Perform Partial Knife Cut

ASCII: SUB or ESC m
Hexadecimal: 1A or 1B 6D
Decimal: 26 or 27 109

Cuts the receipt, leaving 5 mm (.20 inch) of paper. This command is implemented the same as Full Knife Cut (19, 1B 69).

There are two codes for this command and both perform the same function.

Exceptions:

Line Feed is executed first if the buffer is not empty.

This command is processed regardless of which station is selected.

Generate Tone

ASCII: ESC BEL
Hexadecimal: 1B 07
Decimal: 27 7

Generates an audible tone. Performed by the printer to signal certain conditions.

Return Home

ASCII: ESC <
Hexadecimal: 1B 3C
Decimal: 27 60

Moves the impact printhead (unless already there) to the home position.

Related Information:

The printer is able to detect carriage motor jams, eliminating the need to home the printhead after each slip transaction.

Select Peripheral Device (for Multi-Drop)

ASCII: ESC = *n*
Hexadecimal: 1B 3D *n*
Decimal: 27 61 *n*

Value of *n:* 0 (bit 0), device not selected
1 (bit 0), device selected

Default: 1 (bit 0), device selected

Selects the device to which the host computer sends data.

Exception:

This command is ignored.

Initialize Printer

ASCII: ESC @
Hexadecimal: 1B 40
Decimal: 27 64

Default:	**Receipt**	**Slip**
Character Pitch	15.6 CPI	13.9 CPI
Column Width	44 characters	66 characters
Extra Dot Rows	2	3
Character Set	Code Page 437	Code Page 437
Printing Position	Column One	Column One

Clears the print line buffer and resets the printer to the default settings for the startup configuration (refer to Default settings above.)

Single-Wide, Single-High, Non-Rotated, and Left-Aligned characters are set and User-defined characters or logo graphics are cleared (Flash Memory is not affected). Tabs reset to default. Receipt selection state is selected.

Exceptions:

In printers with the Parallel interface, this command also returns paper exhaust to the paper status line if an alternate status has been requested.

Set Slip Paper Eject Length

ASCII: ESC C *n*
Hexadecimal: 1B 43 *n*
Decimal: 27 67 *n*

Value of *n* : 0 to 255

This command is ignored.

Select Receipt or Slip for Printing; Slip for MICR Read

ASCII: ESC c 0 *n*
Hexadecimal: 1B 63 30 *n*
Decimal: 27 99 48 *n*

Value of *n* : 1, 2, 3 Receipt selected

4 Slip selected

Default of *n* : 1

Selects the station for printing. When slip is selected, the printer waits (based on the slip waiting time setting [ie: 1B 66 m n]) for the paper to be inserted. When slip has already been selected and the selection is changed, the form is opened.

If the station has already been selected and it is re-selected, no action takes place.

Exceptions:

Receiving the command discards unprinted data in the buffer, forcing a "beginning of line" state.

When *n* is out of range this command is ignored.

Select Receipt or Slip for Setting Line Spacing

ASCII: ESC c 1 *n*
Hexadecimal: 1B 63 31 *n*
Decimal: 27 99 49 *n*

Value of *n:* 1, 2, 3 Select receipt

4 Select Slip

Default of *n* : 1

Selects which station receives the effects of the following commands:

1. Select Default Line Spacing (1B 32)
2. Set Line Spacing (1B 33)
3. Add *n* extra dot rows (16 *n*)

Exceptions:

This command is ignored if *n* is out of range.

Select Paper Sensors to Output Paper End Signals (Parallel Only)

ASCII: ESC c 3 *n*
Hexadecimal: 1B 63 33 *n*
Decimal: 27 99 51 *n*

Value of *n* :

If either bit 0 or bit 1 is on, the paper roll near-end sensor is selected as the paper sensor outputting paper-end signals.

If either bit 2 or bit 3 is on, the paper roll end sensor is selected as the paper sensor outputting paper-end signals.

Bit	Position	Hex	Decimal	Function
0	Off	00	0	Paper roll near end sensor disabled
	On	01	1	Paper roll near end sensor enable
1	Off	00	0	Paper roll near end sensor disabled
	On	02	2	Paper roll near end sensor enabled
2	Off	00	0	Paper roll end sensor disabled
	On	04	4	Paper roll end sensor enabled
3	Off	00	0	Paper roll end sensor disable
	On	08	8	Paper roll end sensor enabled
4, 5, 6, 7	-	-	-	Undefined

Range of *n* : 1 - 255

Default: 15

Specifies the paper sensor to output a paper end signal. Multiple sensors may be selected to signal when paper has run out. When multiple sensors have been selected, anytime one of the sensors detects a paper end, the paper end signal is output.

When this command is executed a sensor is switched. The paper end signal switching is delayed depending on the receive buffer state.

Select Sensors to Stop Printing

ASCII: ESC c 4 *n*
Hexadecimal: 1B 63 34 *n*
Decimal: 27 99 52 *n*

Value of *n* :

Bit of *n*

Bit	Function
Bit 0, 1	Stop Receipt on Receipt Low
Bit 4	Stop Slip if Trailing Edge Uncovered
Bit 5	Stop Slip if Leading Edge Uncovered

Default: 0

Determines which sensor stops printing on the respective station. The command does not affect the paper out sensor on the receipt station, which will automatically stop the printer when the paper is depleted.

Enable or Disable Panel Buttons

ASCII: ESC c 5 *n*
Hexadecimal: 1B 63 35 *n*
Decimal: 27 99 53 *n*

Value of *n* : 0 = Enable
1 = Disable

Default: 0 (Enable)

Enables or disables the Paper Feed Button. If the last bit is 0, the Paper Feed Button is enabled. If the last bit is 1, the Paper Feed Button is disabled.

Related Information:

Functions that require using the Paper Feed Button (except for the Execute Macro [10 5E] command) cannot be used when it is disabled with this command.

Enable or Disable Online Switch

ASCII: ESC c 6 *n*
Hexadecimal: 1B 63 36 *n*
Decimal: 27 99 54 *n*

Value of *n* : 0, 1

Since the 7158 does not have an Online Switch, this command is ignored.

Set Slip Paper Waiting Time

ASCII: ESC f *m n*
Hexadecimal: 1B 66 *m n*
Decimal: 27 102 *m n*

Value of *m* : Minutes
Value of *n* : Tenths of seconds

Sets the time (in *m* minutes) that the printer waits for a slip to be inserted into the slip station. It also sets the time (*n* x 0.1 seconds) that the printer waits to close the platen and start printing once the slip has been inserted. The printer reads that a slip is inserted when the leading edge and trailing edge sensors are covered. The LED on the slip table is lit (green) when both sensors are covered.

If a slip is not inserted in the time specified, the receipt station is selected for the next function. If *m* = 0, the printer waits forever for a slip to be inserted. The times set by this command are used only by the command, Select Receipt or Slip for Printing, Slip for MICR Read (1B 63 30 *n*), with *n* set to 04.

Generate Pulse to Open Cash Drawer

ASCII: ESC p *n p*1 *p*2
Hexadecimal: 1B 70 *n p*1 *p*2
Decimal: 27 112 *n p*1 *p*2

Value of *n* : 0, 48 = Drawer 1
1, 49 = Drawer 2

Value of *p1* : 0 - 255
Value of *p2* : 0 - 255

Sends a pulse to open the cash drawer.

Formulas:

The value for either *p1* or *p2* is the hexadecimal number multiplied by 2 msec to equal the total time.

1. On time = *p1* x 2 msec
2. Off time = *p2* x 2 msec

Related Information:

The off-time is the delay before the printer performs the next operation. The suggested hexadecimal values for NCR cash drawers are:

p1 = 3C

p2 = 46.

Select or Cancel Parallel Printing Mode on R&J

ASCII: ESC z *n*
Hexadecimal: 1B 7A *n*
Decimal: 27 122 *n*

Because there is no journal station on the printer this command is not implemented and is ignored if received.

Select Slip Station

ASCII: FS
Hexadecimal: 1C
Decimal: 28

Selects the Slip Station for all functions. The receipt station is the default setting after the printer is initialized or the Clear Printer (0x10) command is received.

Select Cut Mode and Cut Paper

ASCII: GS V *m* GS V *m n*
Hexadecimal: 1D 56 *m* 1D 56 *m n*
Decimal: 29 86 *m* 29 86 *m n*

Value of *m* : Selects the mode as shown in the table
Value of *n* : Determines cutting position only if *m* is 65 or 66.

M	Feed and Cut Mode
0, 48	Full cut (no extra feed). Partial cut on the 7158.
1, 49	Partial cut (no extra feed).
65	Feeds paper to cutting position + (*n* times vertical motion unit), and cuts the paper completely.
66	Feeds paper to cutting position + (*n* times vertical motion unit), and performs a partial cut.

Range of *m*: 0, 48; 1, 49
65, 66 (when used with *n*)

Range of *n*: 0 - 255

Default of *n*: 0
Default of *m*: 0

Selects a mode for cutting paper and cuts the paper. There are two formats for this command, one requiring one parameter *m*, the other requiring two parameters *m* and *n*. The format is indicated by the parameter *m*.

Formulas: *n* times the vertical motion unit is used to determine the cutting position to which the paper is fed.

Exceptions:
If *m* is out of the specified range, the command is ignored.

Select Receipt Station

ASCII: RS
Hexadecimal: 1E
Decimal: 31

Selects the Receipt Station for all functions. The receipt station is the default setting after the printer is initialized or the Clear Printer (0x10) command is received.

Print Test Form

ASCII: AX t
Hexadecimal: 1F 74
Decimal: 31 116

Prints the current printer configuration settings on the receipt.

Disabled in page mode.

Exception:

This command is available in A758 Native Mode only.

Vertical Positioning and Print Commands

The vertical positioning and print commands control the vertical print positions of characters on the receipt and slip.

Print and Feed Paper One Line

ASCII: LF
Hexadecimal: 0A
Decimal: 10

Prints one line from the buffer and feeds paper one line.

Carriage Return/Line Feed pair prints and feeds only one line.

Print and Eject Slip

ASCII: FF
Hexadecimal: 0C
Decimal: 12

Prints data from the buffer to the slip station and if the paper sensor is covered, reverses the slip out the front of the printer far enough to be accessible to the operator. The impact station opens the platen in all cases.

This command has the same code as the Print and Return to Standard Mode command, which is executed only when the printer is in Page Mode. When the printer is not in Page Mode this command executes the print and eject slip function.

Exceptions:

This command is ignored if the receipt station is the current station.

Print and Carriage Return

ASCII: CR
Hexadecimal: 0D
Decimal: 13

Prints one line from the buffer and feeds paper one line. The printer can be set through the configuration menu to ignore or use this command. Some applications expect the command to be ignored while others use it as print command.

Related Information:

See Ignoring/Using the Carriage Return in *Diagnostics* for more information.

Carriage Return/ Line Feed pairs prints and feeds only one line.

Feed *n* Print Lines

ASCII: DC4 *n*
Hexadecimal: 14 *n*
Decimal: 20 *n*

Value of *n*: The number of lines to feed at current line height setting.

Range of *n* : 0 – 127 A756 Emulation Mode
0 – 255 A758 Native Mode

Feeds paper *n* lines at the current line height without printing.

Ignored on receipt if the current line is not empty.

Feed *n* Dot Rows

ASCII: NAK *n*
Hexadecimal: 15 *n*
Decimal: 21 *n*

Value of *n*:

	Receipt	**Slip**
	n/203 inch	*n*/72 inch

Range of *n* :
0 – 127 A756 Emulation Mode
0 – 255 A758 Native Mode

Feeds paper *n* dot rows without printing. Receipt moves *n* rows if the print buffer is empty.

Add *n* Extra Dot Rows

ASCII: SYN *n*
Hexadecimal: 16 *n*
Decimal: 22 *n*

Value of *n*:

Receipt	Slip
n/203 inch	*n*/72 inch

Range of *n*: 0 - 12

Default:

Receipt	Slip
3	3

Adds *n* extra dot rows to the character height to increase space between print lines or decrease number of lines per inch.

Formulas:

The following table shows the relationship between the number of lines per inch and each extra dot row added for both the receipt and slip stations:

Receipt Station			Slip Station		
Extra Rows	Lines Per Inch	Dot Rows	Extra Rows	Lines Per Inch	Dot Rows
0	8.47	24	0	10.29	7
1	8.13	25	1	9.00	8
2	7.81	26	2	8.00	9
3	**7.52**	**27**	**3**	**7.20**	**10**
4	7.25	28	4	6.55	11
5	7.00	29	5	6.00	12
6	6.77	30	6	5.54	13
7	6.55	31	7	5.14	14
8	6.35	32	8	4.80	15
9	6.16	33	9	4.50	16
10	5.98	34	10	4.24	17
11	5.81	35	11	4.00	18
12	5.64	36	12	3.79	19

Print

ASCII: ETB
Hexadecimal: 17
Decimal: 23

Prints one line from the buffer and feeds paper one line. Executes LF on receipt. Executes LF on slip if previous character was not a CR.

Set Line Spacing to 1/6 Inch

ASCII: ESC 2
Hexadecimal: 1B 32
Decimal: 27 50

Default: 0.13 Inch (3.33 mm)

Sets the default line spacing to 1/6 of an inch (4.25 mm).

Set Line Spacing

ASCII: ESC 3 *n*
Hexadecimal: 1B 33 *n*
Decimal: 27 51 *n*

Value of *n*: *n*/406 inches on receipt

n/144 inches in slip

Range of *n*: 0 – 255

Default: Receipt .13 inch (3.37 mm or 7.52 lines per inch, 3 extra dot rows.)
Slip .14 inch (7.2 lines per inch, 3 extra dot rows.)

Sets the line spacing for the receipt and for the slip. For the receipt the spacing is set to n/406 inches. For the slip, the line spacing is set to n/144 inches. The line spacing equals the character height when *n* is too small.

If the Set Horizontal and Vertical Minimum Motion Units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of this command (Set Line Spacing) will be interpreted accordingly.

Related Information:

For more information, see the description of the Set Horizontal and Vertical Minimum Motion Units command in this document.

Print and Feed Paper

ASCII: ESC J *n*
Hexadecimal: 1B 4A *n*
Decimal: 27 74 *n*

Value of *n*: *n*/203 inches receipt

n/144 inches slip

Range of *n*: 0 - 255

Prints one line from the buffer and feeds the paper.

On the receipt station, the line height equals the character height when *n* is too small. This does not apply to the slip station. Use *n* = 0 to print a line without feeding the paper. This allows the printer to print on the last line of the slip (at .59 inches from the trailing edge) and still retain the slip in the feed rollers for reverse feeding the paper back out of the slip station.

Related Information:

For more information, see the description of the Set Horizontal and Vertical Minimum Motion Units command in this document.

Print and Reverse Feed Paper

ASCII: ESC K *n*
Hexadecimal: 1B 4B *n*
Decimal: 27 75 *n*

Value of *n*: Slip = *n*/144 of an inch

Range of *n*: 0 - 255

Prints one line from the buffer and reverse feeds the paper *n*/144 of an inch on the slip station.

Exceptions:

The receipt station cannot be reverse fed.

Print and Feed *n* Lines

ASCII: ESC d *n*
Hexadecimal: 1B 64 *n*
Decimal: 27 100 *n*

Value of *n*: Number of lines to be printed and fed.

Range of *n*: 1 – 255
(0 is interpreted as 1 on the receipt station)

Prints one line from the buffer and feeds paper *n* lines at the current line height.

Print and Reverse Feed *n* Lines

ASCII: ESC e *n*
Hexadecimal: 1B 65 *n*
Decimal: 27 101 *n*

Value of *n*: The number of lines on the slip station to be reverse fed.

Range of *n*: 0 – 255

Prints one line from the buffer and reverse feeds the paper *n* lines on the slip station. The receipt station cannot be reverse fed.

Reverse Feed *n* Lines

ASCII: GS DC4 *n*
Hexadecimal: 1D 14 *n*
Decimal: 29 20 *n*

Range of *n* : 0 – 127 A756 Emulation Mode
0 – 255 A758 Native Mode

Reverses the paper feed in the slip station by *n* lines at the current spacing. The next character feed command returns the paper feed back to the normal feed direction. This command is ignored if slip is not the selected station. Current spacing is not a factor.

Reverse Feed *n* Dots

ASCII: GS NAK *n*
Hexadecimal: 1D 15 *n*
Decimal: 29 21 *n*

Value of *n*: *n* dots at 1/72 inch

Range of *n* : 0 – 127 A756 Emulation Mode
0 – 255 A758 Native Mode

Reverses the paper feed in the slip station by *n* dots at 1/72 inch (NCR 7150™ command). This command is ignored if receipt station is selected.

Set Horizontal and Vertical Minimum Motion Units

ASCII: GS P *x y*
Hexadecimal: 1D 50 *x y*
Decimal: 29 80 *x y*

Value of *x*: Horizontal

Value of *y*: Vertical

Range of *x*: 0 – 255

Range of *y*: 0-255

Default: of *x*: 203

Default: of *y*: 203

Sets the horizontal and vertical motion units to 1/*x* inch and 1/*y* inch respectively.

When *x* or *y* is set to 0, the default setting for that motion unit is used.

The default horizontal motion is *x* = 203.

Horizontal Positioning Commands

The horizontal positioning commands control the horizontal print positions of characters on the receipt and slip.

Horizontal Tab

ASCII: HT
Hexadecimal: 09
Decimal: 9

Moves the print position to the next tab position set by the Set Horizontal Tab Positions (1B 44 *n*1 *n*2 ... 00) command. The print position is reset to column one after each line.

Tab treats the left margin as column one, therefore changes to the left margin will move the tab positions.

When there are no tabs defined to the right of the current position, or if the next tab is past the right margin, line feed is executed (both slip and receipt.) HT has no effect in page mode. Printer initialization sets 32 tabs at column 9, 17, 25, …

Set Column

ASCII: ESC DC4 *n*
Hexadecimal: 1B 14 *n*
Decimal: 27 20 *n*

Value of *n*:

	Receipt	Slip
	1 - 44 (Standard)	1 - 66 (Standard)
	1 - 56 (Compressed)	1 - 80 (Compressed)

Default of *n*: 1

Prints the first character of the next print line in column *n*. It must be sent for each line not printed at column one. The value of *n* is set to one after each line.

Exceptions:

The command cannot be used with Single- or Double-Density graphics.

Set Absolute Starting Position

ASCII: ESC $ *n1 n2*
Hexadecimal: 1B 24 *n1 n2*
Decimal: 27 36 *n1 n2*

Value of *n*: Number of dots to be moved from the beginning of the line.

Value of *n1* : Remainder after dividing *n* by 256.

Value of *n2* : Integer after dividing *n* by 256.

The values for *n*1 and *n*2 are two bytes in low byte, high byte word orientation.

Sets the print starting position to the specified number of dots (up to the right margin) from the beginning of the line. The print starting position is reset to the first column after each line.

Formulas:

Determine the value of *n* by multiplying the column for the absolute starting position by 10 (slip, or receipt standard pitch) or 8 (receipt compressed pitch). The example shows how to calculate column 29 (10 dots per column) as the absolute starting position.

28 x 10 = 280 dots (beginning of column 29)
280/256 = 1, remainder of 24
*n*1 = 24 *n*2 = 1

Related Information:

This command is also used in the graphics mode on the receipt. See Graphics Commands in this chapter for more information.

If the Set Horizontal and Vertical Minimum Motion Units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of this command (Set Absolute Print Position) will be interpreted accordingly. For more information, see the description of the Set Horizontal and Vertical Minimum Motion Units command (1D 50) in this document.

Set Horizontal Tabs

ASCII: ESC D *[n] k* NUL
Hexadecimal: 1B 44 *[n] k* 00
Decimal: 27 68 *[n] k* 0

Value of *n*: Column for tab minus one.
n is always less than or equal to the current selected column width.

Value of *k*: 0 - 32

Default: Every 8 characters from column. 1 (9, 17, 25, etc.) for normal print.

Sets up to 32 horizontal tab positions *n* columns from column one, but does not move the print position. See the Horizontal Tab (09) command.

The tab positions remain unchanged if the character widths are changed after the tabs are set. This command ends with hexadecimal 00; hexadecimal 1B 44 00 clears all tabs. Tabs assumed to be in strictly ascending order. A tab out of order terminates the command string as if it were 00, and remaining tab values are taken as normal data.

Formulas:

Set the tab positions in ascending order and put Hex 00 at the end.

Hex 1B 44 00 (number of tabs not specified) clears all tab positions.

Exceptions:

The tabs cannot be set higher than the column width of the current pitch.

Set Relative Print Position

ASCII: ESC \ *n1 n2*
Hexadecimal: 1B 5C *n1 n2*
Decimal: 27 92 *n1 n2*

Value of *n*:

To Move the Relative Starting Position Right of the Current Position by *n* dots:
*n*1 = Remainder after dividing *n* by 256.
*n*2 = Integer after dividing *n* by 256.

The values for *n*1 and *n*2 are two bytes in low byte, high byte word orientation.

To Move the Relative Starting Position Left of the Current Position by *n* dots:
*n*1 = Remainder after dividing (65,536-*n*) by 256
*n*2 = Integer after dividing (65,536-*n*) by 256

The values for *n*1 and *n*2 are two bytes in low byte, high byte word orientation.

Moves the print starting position the specified number of dots either right (up to the right margin) or left (up to the left margin) of the current position. The print starting position is reset to the first column after each line.

(Set Relative Print Position—continued on the next page)

Formulas:

To move to the left:

Determine the value of *n* by multiplying the number of columns to move left of the current position by 10 (slip or receipt standard pitch) or 8 (receipt compressed pitch). The example shows how to set the relative position two columns in standard pitch (10 dots per column) to the left of the current position.

2 x 10 = 20 dots (two columns to be moved left of the current position)
65,536-20 = 65516

65,516/256 = 255, remainder of 236
n1 = 236 *n2* = 255

To move to the right:

Determine the value of *n* by multiplying the number of columns to move right of the current position by 10 (slip or receipt standard pitch) or 8 (receipt compressed pitch). The example shows how to set the relative position two columns in standard pitch (10 dots per column) to the right of the current position.

2 x 10 = 20 dots (two columns to be moved right of the current position)
20/256 = 0, remainder of 20
n1 = 20 *n2* = 0

Related Information:

If the Set Horizontal and Vertical Minimum Motion Units command (1D 50) is used to change the horizontal and vertical minimum motion unit, the parameters of this command (Set Relative Print Position) will be interpreted accordingly. For more information, see the description of the Set Horizontal and Vertical Minimum Motion Units command (1D 50) in this document.

Compatibility Information (7158 receipt vs. 7156 receipt)

There is a difference in the normal behavior of this command in **A758 Native** Mode as compared to the original **7156**. The difference exists when the command is used to move to the left. The **7156** processes the whole print string prior to putting it in the buffer for the print head. This method of processing allows the **7156** to backup in the print string and replace characters and their associated attributes when a "Set Relative Print Position" command instructs the printer to move the print position to the left.

In order to improve the speed of printing, the **7158** moves the data into a buffer for the printhead when it receives it. When the "Set Relative Print Position" command contains a move to the left, this causes the new data to overstrike the previous data. This behavior can be used to an application's advantage to provide the ability to create compound characters on the receipt station.

Select Justification

ASCII: ESC a *n*
Hexadecimal: 1B 61 *n*
Decimal: 27 97 *n*

Value of *n*: 0, 48 = Left Aligned
1, 49 = Center Aligned
2, 50 = Right Aligned

Range of *n*: 0 – 2, 48-50

Default: 0 (Left aligned)

Specifies the alignment of the characters, graphics, logos, and bar codes on the receipt station.

Exceptions:

The command is valid only when input at the beginning of a line.

Set Left Margin

ASCII: GS L *nL nH*
Hexadecimal: 1D 4C *nL nH*
Decimal: 29 76 *nL nH*

Range of *nL*: 0 - 255

Range of *nH*: 0 - 255

Default : 576 dots (the maximum printable area)

Sets the left margin of the printing area. The left margin is set to (((*nH* X 256) + *nL*) times horizontal motion unit) inches. The horizontal motion units are set by the Set Horizontal and Vertical Minimum Motion Units command (1D 50), described in this manual.

The width of the printing area is set by the Set Printing Area Width command (1D 57), which follows this command. See the Set Printing Area Width command (1D 57) in this document for a description of that command.

If the setting exceeds the printable area, the maximum value of the printable area is used. The maximum printable area is 576 dots. See the illustration.

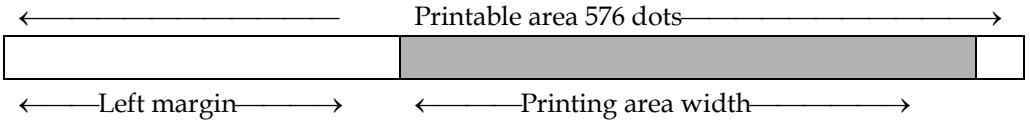
Formulas:
To set the left margin to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

```
GS  L  203  0
```

Or, to set the left margin to two inches at the default horizontal motion unit of 1/203 units per inch, send the four-byte string:

```
GS  L  150  1
```

Where 2 inches = 406/203, and 406 = (1 X 256) + 150.



Exceptions:
The command is effective only at the beginning of a line.

This command is ignored if the line buffer is not empty, and only effects the Receipt interface.

Set Printing Area Width

ASCII: GS W *nL nH*
Hexadecimal: 1D 57 *nL nH*
Decimal: 29 87 *nL nH*

Range of *nL*: 0 – 255

Range of *nH*: 0 - 255

Default: 576 dots (the maximum printable area)

Sets the width of the printing area. If the setting exceeds the printable area, the maximum value of the printable area is used.

The width of the printing area is set to (((*nH* X 256) + *nL*) times horizontal motion unit) inches. The horizontal motion units are set by the Set Horizontal and Vertical Minimum Motion Units command (1D 50).

The width of the printing area follows the Set Left Margin command (1D 4C).
See the Set Left Margin command (1D 4C…) earlier in this document for a description.

Formulas:

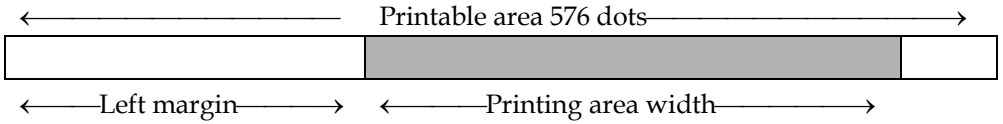
To set the width of the printing area to one inch at the default horizontal motion unit of 1/203 inches, send the four-byte string:

```
GS  W  203  0
```

Or, to set the width of the printing area to two inches at the default horizontal motion unit of 1/203 units per inch, send the four-byte string:

```
GS  W  150  1
```

Where 2 inches = 406/203, and 406 = (1 X 256) + 150.



Exceptions:
This command is effective only at the beginning of a line. If the setting exceeds the printable area, the maximum value of the printable area is used. The maximum printable area is 576 dots. See the illustration.

Print Characteristic Commands

These commands control what the printed information looks like: selection of character sets, definition of custom-defined characters, and setting of margins. The commands are described in order of their hexadecimal codes

Select Double-Wide Characters

ASCII: DC2
Hexadecimal: 12
Decimal: 18

Prints double-wide characters. The printer is reset to single-wide mode after a line has been printed or the Clear Printer (0x10) command is received. Double-wide characters may be used in the same line with single-wide characters.

Select Single-Wide Characters

ASCII: DC3
Hexadecimal: 13
Decimal: 19

Prints single-wide characters. Single-wide characters may be used in the same line with double-wide characters.

Select 90 Degree Counter-Clockwise Rotated Print

ASCII: ESC DC2
Hexadecimal: 1B 12
Decimal: 27 18

Rotates characters 90 degrees counter-clockwise. The command remains in effect until the printer is reset or until a Clear Printer (0x10), Select or Cancel Upside-Down Print (1B 7B), or Select or Cancel Rotated Print (1B 56) command is received.

Exceptions:

This command is valid only at the beginning of a line.

Rotated print and non-rotated print characters cannot be used together in the same line.

Related Information:

See Summary of Rotated Printing in this chapter.

Select Pitch (Column Width)

ASCII: ESC SYN *n*
Hexadecimal: 1B 16 *n*
Decimal: 27 22 *n*

Value of *n*: 0 = Standard Pitch
1 = Compressed Pitch

Default: 0 (Standard pitch)

Selects the character pitch for a print line.

Formulas:

The following table provides the print characteristics for both pitches on the receipt and slip stations.

Pitch	Receipt Columns	Receipt CPI	Slip Columns	Slip CPI
Standard	44	15.6	66	13.9
Compressed	56	20.3	80	17.1

Related Information:

See "Technical Specifications" for descriptions of character pitches (print modes).

Set Character Right-Side Spacing

ASCII: ESC SP *n*
Hexadecimal: 1B 20 *n*
Decimal: 27 32 *n*

Range of *n*: 0 - 32

Default : 0

Sets the right side character spacing to [*n* x horizontal or vertical motion units]. Values for this command are set independently in Standard and Page Mode.

The units of horizontal and vertical motion are specified by the Set Horizontal and Vertical Minimum Motion Units (1D 50…) command. Changes in the horizontal or vertical units do not affect the current right side character spacing. When the horizontal or vertical motion unit is changed by the Set Horizontal and Vertical Minimum Motion Units (1D 50…) command the value must be in even units and not less than the minimum amount of horizontal movement.

In Standard Mode the horizontal motion unit is used.

In Page Mode the horizontal or vertical motion unit differs and depends on the starting position of the printable area. When the starting printing position is the upper left or lower right of the printable area (set by Select Print Direction in Page Mode, 1B 54 n) the horizontal motion unit (*x*) is used. When the starting printing position is the upper right or lower left of the printable area (set by Select Print Direction in Page Mode, 1B 54 n) the vertical motion unit (*y*) is used.

Exception:

This command is ignored in **A756 Emulation** Mode and is only valid on the receipt station.

Select Print Modes

ASCII: ESC ! *n*
Hexadecimal: 1B 21 *n*
Decimal: 27 33 *n*

Value of *n*: Pitch selection (standard, compressed, double high, or double wide.)

Value of *n*

Bit	Function	0	1
Bit 0	Pitch	Standard Pitch[1] 44 Col/Line, 15.6 CPI (Rec) 66 Col/Line, 13.9 CPI (Slip)	Compressed Pitch 56 Col/Line, 20.3 CPI (Rec) 80 Col/Line, 17.1 CPI (Slip)
Bit 3	Emphasized Mode	Canceled	Set
Bit 4	Double-high[2]	Canceled	Set
Bit 5	Double-wide	Canceled	Set
Bit 7	Underlined Mode	Canceled	Set

Bits 1, 2, 6 are not used.

[1]Standard and compressed pitch cannot be used together in the same line.
[2]Double-high characters cannot be used with normal characters in the same line, nor can they be used on the slip station.

Default: 0 (for bits 0, 3, 4, 5, 7)

Selects the print mode: standard, compressed, double high, or double wide.

Related Information:

The bits in this command perform the same function as the standalone functions:

1B 16 nSelect Pitch
1B 45 nEmphasized
12 Double-wide
13 Single-wide
1B 2D n Underline

Select or Cancel User-Defined Character Set

ASCII: ESC % *n*
Hexadecimal: 1B 25 *n*
Decimal: 27 37 *n*

Value of *n*: 0= Code Page 437
1= User-defined (RAM character set) with Code Page 437 as the basis
2= Code Page 850
3= User-defined (RAM character set) with Code Page 850 as the basis

Range: 0 - 3

Default: 0 (Code Page 437)

Selects either the Code Page 437 character set, the Code Page 850 character set, or the User-Defined character set. If the User-Defined character set is selected, this command also designates whether the Code Page 437 character set or the Code Page 850 character set is used as the basis for the User-Defined character set. When you define a character set, you do not have to define every character - the characters from the designated basis character set are used for any undefined characters. See the *Printing Specification Guide* for the character sets.

Exceptions:

Different character sets cannot be used together on the same line.

Define User-Defined Characters

	Receipt	Slip
ASCII:	ESC & 3 *c*1 *c*2 *n*1 *d*1 ... *n*n *d*n	ESC & 0 *c*1 *c*2 *d*1 ... *d*n
Hexadecimal:	1B 26 3 *c*1 *c*2 *n*1 *d*1 ... *n*n *d*n	1B 26 0 *c*1 *c*2 *d*1 ... *d*n
Decimal:	27 38 3 *c*1 *c*2 *n*1 *d*1 ... *n*n *d*n	27 38 0 *c*1 *c*2 *d*1 ... *d*n

Defines and enters downloaded characters into RAM or Flash. The command may be used to overwrite single characters. User-defined characters are available until power is turned off or the Initialize Printer command (1B 40) is received.

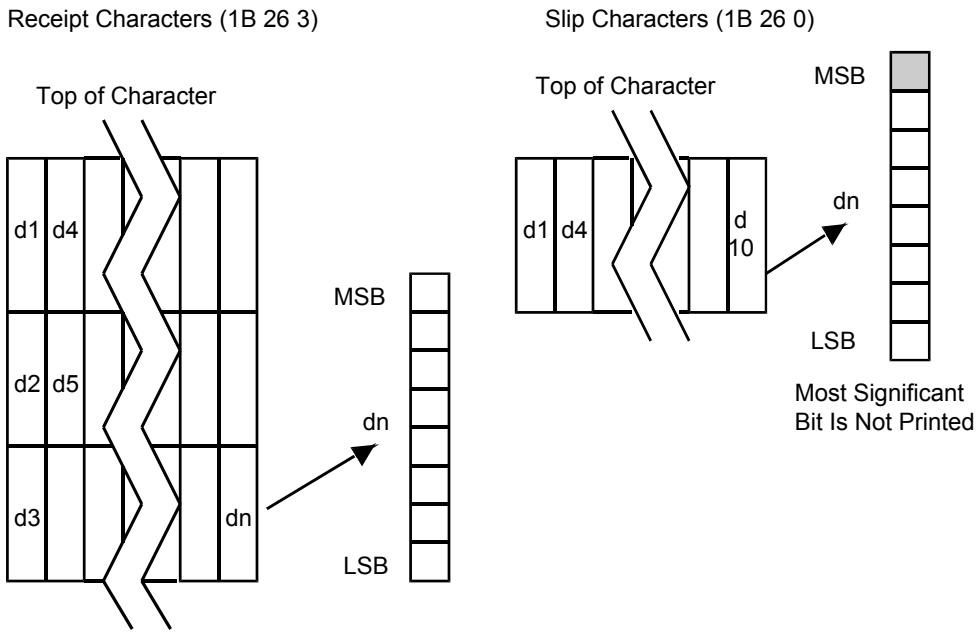
Any invalid byte (*s*, *c*1, *c*2, *n*1) aborts the command.

User-defined character sets for both slip and receipt may be used at the same time. The command clears bit image logo data from RAM. The illustration below provides a sample of a character cell.

Defining User-Defined Characters for the Slip and Receipt Station

Defines and enters downloaded characters into RAM.

(Define User-Defined Characters—continued on the next page)



Values and Ranges:

Receipt

c = the ASCII codes of the first (*c*1) and last (*c*2) characters respectively
*c*1 = Hex 20-FF (Hex 20 is always printed as a space)
*c*2 = Hex 20-FF (Hex 20 is always printed as a space)

To define only one character, use the same code for both *c*1 and *c*2.

n = the number of dot columns for the nth character as specified by *n*1 ... *n*n

n = 1-10 (standard pitch), 12 and less accepted but ignored
n = 1-8 (compressed pitch), 12 and less accepted but ignored

d = the column data for the nth character as specified by *d*1 ... *d*n

The number of bytes for a particular character cell is 3 x *n*1.

The bytes are printed down and across each cell.

Slip

c = the ASCII codes of the first (*c*1) and last (*c*2) characters respectively

*c*1 = Hex 20-FF (Hex 20 is always printed as a space)
*c*2 = Hex 20-FF (Hex 20 is always printed as a space)

To define only one character, use the same code for both *c*1 and *c*2.

d = the column data for the nth character as specified by *d*1 ... *d*n

Each character is defined by 12 bytes (only bytes 2-11 are printed.)

Each byte is one 7-dot high column (full- or half-dot column.)

Overlapped dots are not printed

The data must contain [(*c*2 - *c*1 + 1) x 12] bytes

Related Information:

See 1D 22 *n* (Select Memory Type Where to Save User-Defined Fonts.)

Select or Cancel Underline Mode

ASCII: ESC - *n*
Hexadecimal: 1B 2D *n*
Decimal: 27 45 *n*

Value of *n*: 0, 48 = Cancel underline mode
1, 49 = Select underline mode

Default of *n*: 0 (Cancels underline mode)

Turns underline mode on or off. Underlines cannot be printed for spaces set by the Horizontal Tab, Set Absolute Start Position, or Set Relative Print Position commands.

This command and the Select Print Mode(s) command (1B 21) turn underline on and off in the same way.

Exceptions:

This command is ignored if *n* is out of the specified range.

This command is only available in **A758 Native** Mode.

Copy Character Set from ROM to RAM

ASCII: ESC : 0 0 0
Hexadecimal: 1B 3A 30 30 30
Decimal: 27 58 48 48 48

Default: Code Page 437

Copies characters in the active ROM set to RAM. Use this command to re-initialize the User-Defined Character Set. Code Page 437 is copied by default at initialization.

The command is ignored if current font is the user font.

Related Information:

To modify characters in one of the character set variations, such as Rotated Print, select one of the Rotated Print commands, copy to RAM, then use the Define User-Defined Character Set command (1B 26).

Cancel User-Defined Characters

ASCII: ESC ? *n*
Hexadecimal: 1B 3F *n*
Decimal: 27 63 *n*

Value of *n*: Specified character code

Range of *n*: 32 - 255

Cancels the pattern defined for the character code specified by *n*. After the user-defined character is canceled, the corresponding pattern from Code Page 437 is printed.

Exceptions:
This command is ignored if *n* is out of range or if the user-defined character is not defined.

Select or Cancel Emphasized Mode

ASCII: ESC E *n*
Hexadecimal: 1B 45 *n*
Decimal: 27 69

Value of *n*: 0 (bit 0), not selected
1 (bit 0), selected

Range of *n*: 0 - 255

Default: 0 (bit 0)

Starts or stops emphasized printing on slip and receipt. In Emphasized Mode on the slip, each line is printed twice to improve penetration of multi-part forms and increase print contrast. The second pass is printed the same direction as the first to ensure accuracy of the overprint. Printing speed decreases due to the second printing pass.

Exceptions:

Only the lowest bit of *n* is effective. Emphasized printing cannot be used with bit-images or downloaded bit-images.

Related Information:

This command and the Select Print Mode(s) command (1B 21) function identically.

Select Double Strike

	A756 Emulation	A758 Native
ASCII:	ESC G	ESC G n
Hexadecimal:	1B 47	1B 47 n
Decimal:	27 71	27 71 n
Value of *n*:	0 = Off 1 = On	

Turns double strike mode on for the slip station. Overprints a second pass of the print line on the slip station to improve penetration of multi-part forms and increase print contrast. The second pass is printed the same direction as the first to ensure accuracy of the overprint. The printer is reset to the standard print mode after a line has been printed or after a Clear Printer (0x10) command is received.

Exceptions:
The settings do not apply in Page Mode. However they can be set or cleared in Page Mode.

Double-strike printing cannot be used with bit-images or downloaded bit-images.

This command functions the same as the **7156** when the printer is in **A756 Emulation** Mode. In Native Mode, the command takes a parameter to enable and disable it.

Related Information:

Printer output is the same as in Emphasized Mode.

Cancel Double Strike

ASCII: ESC H
Hexadecimal: 1B 48
Decimal: 27 72

Turns off double strike mode on the slip station in **A756 Emulation** Mode.

This command is ignored in the **A758 Native** Mode.

This command works on both slip and receipt stations.

Select or Cancel Italic Print

ASCII: ESC I *n*
Hexadecimal: 1B 49 *n*
Decimal: 27 73 *n*

Value of *n*: 0 = Off
1 = On

(When 0 and 1 are the Least Significant Bit, LSB)

Default: 0 (Off)

Turns Italic print mode on or off. This command is only available in **A758 Native** Mode. Italic print mode is available for built-in, user-defined characters. This command only works on the receipt station.

Exceptions:

Only the lowest bit of *n* is valid. This command is only valid for the receipt station in **A758 Native** Mode.

Select International Character Set

ASCII: ESC R *n* *or* ESC t *n*
Hexadecimal: 1B 52 *n* *or* 1B 74 *n*
Decimal: 27 82 *n* *or* 27 116 *n*

	A758 Native Mode	A756 Emulation
Value of *n*:	0 = Code Page 437 1 = Code Page 850 2 = Code Page 852 3 = Code Page 860 4 = Code Page 863 5 = Code Page 865 6 = Code Page 858 7 = Code Page 866	0 = Code Page 437 1 = Code Page 850
Default:	0 (Code Page 437)	

Selects the character set to be used. See *Print Specifications* for the character sets.

There are two codes for this command. Both codes perform the same function.

Exceptions:

The character sets cannot be used together on the same line.

Related Information:

This command may also be known as Select Character Code Table.

Select Character Code Table

See the previous command, Select International Character Set.

Select or Cancel Unidirectional Printing Mode

ASCII: ESC U *n*
Hexadecimal: 1B 55 *n*
Decimal: 27 85 *n*

Value of *n*: 0 = select bi-directional
1 = select unidirectional

Default: 0

Toggles between unidirectional and bi-directional printing on the slip station. Unidirectional printing increases column alignment and provides higher quality printing. Printing is normally bi-directional because of the faster speed.

Select or Cancel 90 Degrees Clockwise Rotated Print

ASCII: ESC V *n*
Hexadecimal: 1B 56 *n*
Decimal: 27 86 *n*

Value of *n*: 0 = Cancel
1 = Set

Default: 0

Rotates characters 90 degrees clockwise. The command remains in effect until the printer is reset or the Clear Printer (0x10) command is received. See Summary of Rotated Printing in this chapter.

Select or Cancel Upside Down Printing Mode

ASCII: ESC { *n*
Hexadecimal: 1B 7B *n*
Decimal: 27 123 *n*

Value of *n*: 0 = Cancel
1 = Set

Default: 0 (Cancel)

Prints upside-down characters. The character order is inverted in the buffer so text is readable. The command remains in effect until the Rotated Print (1B 12) command is received. Only bit 0 is used. Bits 1-7 are not used. See Summary of Rotated Printing in this document for more information.

Exceptions:

The command is valid only at the beginning of a line.
The Rotated Print command (1B 12) cancels this command.

Select Character Size

ASCII: GS ! *n*
Hexadecimal: 1D 21 *n*
Decimal: 29 33 *n*

Value of *n*: 1 - 8 = vertical number of times normal font
1 – 8 = horizontal number of times normal font

Range of *n*: 00 – 07, 10 – 17, … 70 – 77

Default of *n*: 0

Selects the character height using bits 0 to 2 and selects the character width using bits 4 to 7, as follows:

Character Width Selection		
Hex	**Decimal**	**Width**
00	0	1 (normal)
10	16	2 (two times width)
20	32	3 (three times width)
30	48	4 (four times width)
40	64	5 (five times width)
50	80	6 (six times width)
60	96	7 (seven times width)
70	112	8 (eight times width)

Character Height Selection		
Hex	**Decimal**	**Height**
00	0	1 (normal)
01	1	2 (two times height)
02	2	3 (three times height
03	3	4 (four times height)
04	4	5 (five times height)
05	5	6 (six times height)
06	6	7 (seven times height)
07	7	8 (eight times height)

This command is effective for all characters (except for HRI characters).

In Standard Mode, the vertical direction is the paper feed direction, and the horizontal direction is perpendicular to the paper feed direction. However, when character orientation changes in 90 degree clockwise-rotation mode, the relationship between vertical and horizontal directions is reversed.

In Page Mode, vertical and horizontal direction are based on the character orientation. When characters are enlarged with different sizes on one line, all the characters on the line are aligned at the baseline.

The Select Print Mode (1B 21 n) command can also select or cancel double-width and double-height modes. However, the setting of the last received command is effective.

(Select Character Size—continued on the next page)

Exceptions:

If *n* is out of the defined range, this command is ignored. This command is only valid for the receipt station.

This is only available in A758 Native Mode.

Select or Cancel White/Black Reverse Print Mode

ASCII: GS B *n*
Hexadecimal: 1D 42 *n*
Decimal: 29 66 *n*

Value of *n*: 0 = Off
1 = On
(Only the lowest bit is used.)

Range of *n*: 0 – 255

Default of *n*: 0 (Off)

Turns on White/Black reverse printing mode. This command is only available in A758 Native Mode. In White/Black reverse printing mode, print dots and non-print dots are reversed, which means that white characters are formed by printing a black background. When the White/Black reverse printing mode is selected it is also applied to character spacing which is set by Right-Side Character Spacing (1B 20).

This command can be used with built-in characters and user-defined characters, but does not affect the space between lines.

White/Black Reverse Print Mode does not affect bit image, downloaded bit image, bar code, HRI characters, and spacing skipped by Horizontal Tab (09), Set Absolute Starting Position (1B 24…), and Set Relative Print Position (1B 5C).

White/Black reverse mode has a higher priority than Underline Mode. When Underline Mode is on and White/Black Reverse Print Mode is selected, Underline Mode is disabled, but not canceled.

Exceptions:

This command is only valid on the receipt station.

This is only available in A758 Native Mode.

Select Superscript or Subscript Modes

ASCII: AX ENQ *n*
Hexadecimal: 1F 05 *n*
Decimal: 31 05 *n*

Value of *n*: 0 = Normal character size
1 = Select subscript size
2 = Select superscript size

Default: 0 (normal size)

Turns superscript or subscript modes on or off. This attribute may be combined with other characters size settings commands (12, 13, 1B 21 *n*, 1D 21 *n*, …)

This command is only available on the receipt station in A758 Native Mode.

Exceptions:

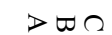
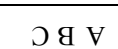
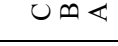
This command is ignored if *n* is out of the specified range.

This is only available in A758 Native Mode.

Summary of Rotated Printing

The table shows the combinations of Set/Cancel Upside-Down Print, Set/Cancel Rotated Print (clockwise), and Rotated Print (counterclockwise). Rotated CCW is mutually exclusive with the other two commands. Unintended consequences may result when rotated CCW is mixed with other commands.

The samples of the print show only the normal size characters. Double-wide and double-high characters are printed in the same orientation (double-high characters cannot be printed on the slip station). They may also be mixed on the same line.

Upside Down (1B 7B *n*)	Rotated CW (1B 56 *n*)	Rotated CCW (1B 12)	Resulting Output
Canceled	Canceled	Cleared	A B C
Canceled	Set	X	
Set	Canceled	X	
Set	Set	X	
X	X	Set	

Note: The following print modes cannot be mixed on the same line:

1. Standard and compressed pitch
2. Vertical (normal) and rotated
3. Right-side up and upside down
4. Single high (normal) and double high

Graphics Commands

These commands are used to enter and print graphics data and are described in order of their hexadecimal codes.

Download BMP Logo

ASCII:	ESC followed by the BMP file data characters
Hexadecimal:	1B followed by the BMP file data characters
Decimal:	27 followed by the BMP file data characters
Value:	Maximum width = 576 Maximum height = 512

Enters a BMP file into RAM or Flash.

This command is used by sending the file data of a monochrome BMP file preceded by a hexadecimal 1B character. The bit map is stored in the printer in the same manner as a downloaded bit image.

The downloaded BMP file can be printed by using the Print Downloaded Bit Image (1D 2F m) command.

Exceptions:

BMP file images that are not monochrome are ignored. This command is only valid for the receipt station.

Note: This is only available in A758 Native Mode. If multiple logos are to be defined and used, this command should be preceded by the Select Current Logo Command to define the number by which this downloaded logo is to be referenced.

Related Information:

See 1D 22 n (Select Memory Type to save logos.)

Select Bit Image Mode

ASCII: ESC * *m* *n*1 *n*2 *d*1 ... *d*n
Hexadecimal: 1B 2A *m* *n*1 *n*2 *d*1 ... *d*n
Decimal: 27 42 *m* *n*1 *n*2 *d*1 ... *d*n

Sets the print resolution and enters one line of graphics data into the print buffer. Excess data is accepted but ignored. Any print command is required to print the data, after which the printer returns to normal processing mode.

See the illustration graphic representation of the bit image.

In A756 Emulation Mode, slip graphics are only 7- bit (MSB not printed.) In A758 Native Mode, slip graphics are 8-bit.

(Select Bit Image Mode—continued on the next page)

Values:

Receipt Station

Value of *m*	Mode	No. of Dots (Vertical)	No. of Dots (Horizontal)	Number of Dots/Line
0	8 Dot Single Density	8 (68 DPI)	0 – 288 (101 DPI)	8 x 288
1	8 Dot Double Density	8 (68 DPI)	0 – 576 (203 DPI)	8 x 576
32	24 Dot Single Density	24 (203 DPI)	0 – 288 (101 DPI)	24 x 288
33	24 Dot Double Density	24 (203 DPI)	0 – 576 (203 DPI)	24 x 576

Slip Station

Value of *m*	Mode	No. of Dots** (Vertical)	No. of Dots (Horizontal)	Number of Dots/Line
0	7 Dot Single Density	7 (72 DPI)	330 (69.5 DPI)	7 x 330
1*	7 Dot Double Density	7 (72 DPI)	660 (139 DPI)	7 x 660
32, 33	Not Available on Slip			

In single density, one byte (7 dots) is printed in each full dot column; in double density, one byte is printed in each half/full dot column.

*Adjacent horizontal dots (overlapping dots) are not printed on the slip.

**In A758 Native Mode. There are 8 vertical dots.

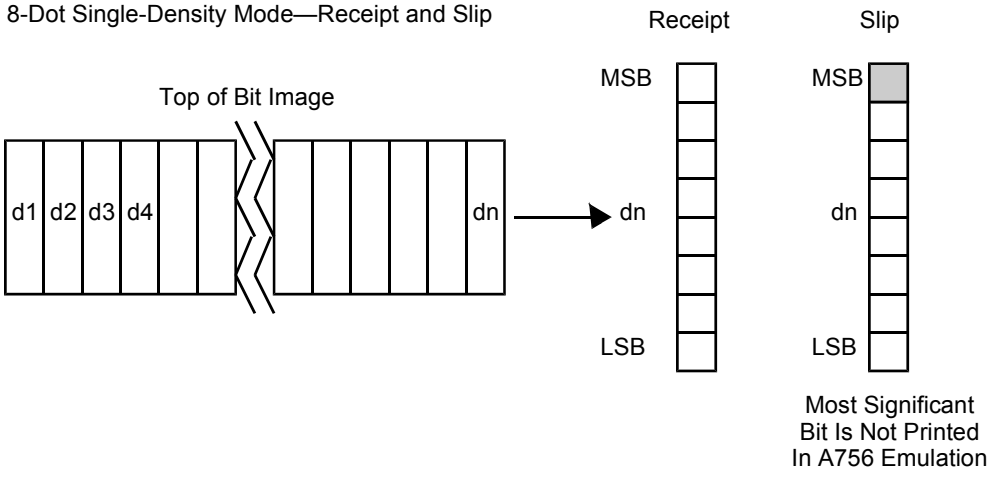
Value of *n* (8-Dot Single-Density Mode)	Value of *n* (24-Dot Single-Density Mode)	Value of *d*
n1 + (256 x n2)	3 x [n1 + (256 x n2)]	Number of Bytes of Data*

*Printed left to right (8-dot mode); Printed down then across (24-dot mode).

Formulas:

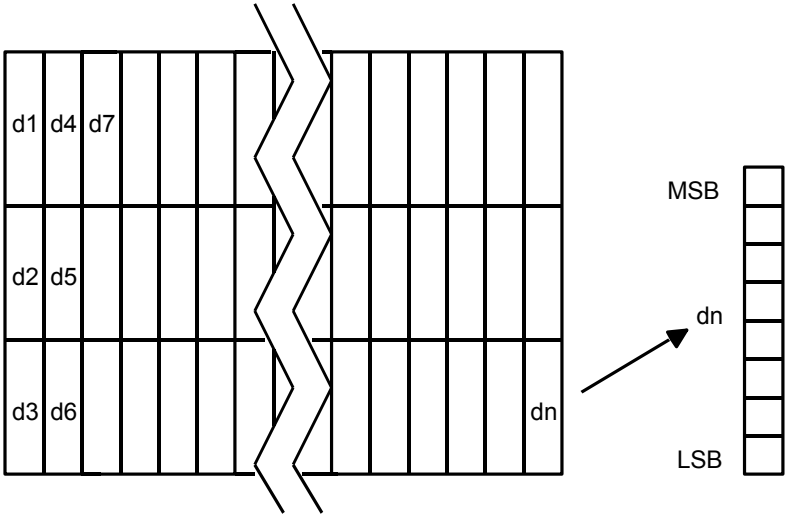
8 Dot Single Density $n1 + (256 \times n2)$
24 Dot Single Density $3 \times [n1 + (256 \times n2)]$

(Select Bit Image Mode—continued on the next page)



24-Dot Single-Density Mode—Receipt Only

Top of Bit Image



Select Double-Density Graphics

ASCII:	ESC Y *n*1 *n*2 *d*1 … *d*n	or	ESC L *n*1 *n*2 *d*1 ... *d*n
Hexadecimal:	1B 59 *n*1 *n*2 *d*1 ... *d*n	or	1B 4C *n*1 *n*2 *d*1 … *d*n
Decimal:	27 89 *n*1 *n*2 *d*1 ... *d*n	or	27 76 *n*1 *n*2 *d*1 ... *d*n

Value of *n*:

Value of *n* (8-Dot Single Density Mode)	Value of *n* (24-Dot Single Density Mode)	Value of *d*
*n*1 + (256 x *n*2)	3 x [*n*1 + (256 x *n*2)]	Number of Bytes of Data (Printed Down, Then Across)

Enters one line of 7 (slip in 7156 mode) or 8-dot double-density graphics into the print buffer. Any print command is required to print the line, after which the printer returns to normal processing mode. The number of bytes sent is represented by the formulas in the table.

Each bit corresponds to one horizontal dot. Compare to Set Bit Image Mode (1B 2A, m=1) earlier in this document.

Exception:

1B 4C *n*1 *n*2 *d*1 … *d*n is only valid in A756 Emulation Mode.

Select the Current Logo (Downloaded Bit Image)

ASCII: GS # *n*
Hexadecimal: 1D 23 *n*
Decimal: 29 35 *n*

Range of *n*: 0 – 255

Selects a logo to be defined or printed. The active logo *n* remains in use until this command is sent again with a different logo *n*.

When this command precedes a logo definition, that definition is stored in Flash Memory as logo *n*. If there is already a different definition in Flash Memory for logo *n*, the first is inactivated and the new definition is used. The inactive definition is not erased from Flash and continues to take up space in Flash Memory.

When this command precedes a logo print command and *n* is different from the previously active logo selected, the printer retrieves the logo definition for *n* from Flash Memory and prints it. If there is no definition for logo *n*, then no logo is printed.

In the case of a previously existing application that expects only one possible logo, the printer will not receive the Select Current Logo (1D 23 *n*) command. In this case, the printer assigns 0 as the active logo identifier. It automatically stores any new logo definition in Flash Memory as logo 0, inactivating any previous logo 0 definition. If the Flash Memory space available for logos fills up with inactive logo 0 definitions, the firmware erases the old definitions at the next power cycle. This is the only case in which the printer erases Flash Memory without an application command.

In the case of a new application using multiple logos, the Select Current Logo (1D 23 *n*) command is used. After that, the printer no longer automatically erases the logo definition Flash Memory page when it fills with multiple definitions. A new application using multiple logos, writing a user-defined character set into Flash Memory, or both, is responsible for erasing the logo and user-defined character set Flash Memory page when the logo area is full or before a new character set is defined.

Exceptions:

This command is only valid for the receipt station. However, it will be processed correctly regardless of whether the receipt station is currently selected.

Define Downloaded Bit Image

ASCII: GS * *n*1 *n*2 *d*1 ... *d*n]
Hexadecimal: 1D 2A *n*1 *n*2 *d*1 ... *d*n]
Decimal: 29 42 *n*1 *n*2 *d*1 ... *d*n

Value of *n1*: See the following table.
Value of *n2*: See the following table.
Value of *d*: See the following table.

Value of *n*1	Value of *n*2	Value of *d*
1-56 (8 x *n*1 = Number of Horizontal Dot Columns)	1-64 (Number of Vertical Bytes)*	Bytes of Data (Printed Down Then Across)

*The number of bytes sent is represented by the following formula:

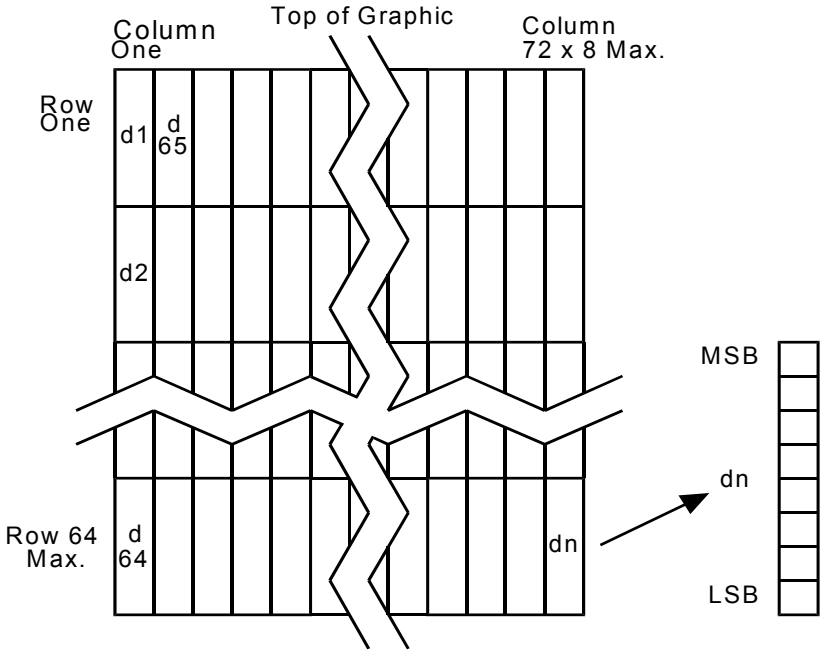
n = 8 x *n*1 x *n*2 (*n*1 x *n*2 must be less than or equal to 4608).

Enters a downloaded bit image (such as a logo) into RAM or Flash with the number of dots specified by *n*1 and *n*2 in A756 Emulation, unless loaded into Flash. The downloaded bit image is available until power is turned off, another bit image is defined, or either Initialize Printer (1B 40), or Define User-Defined Character Set (1B 26), command is received.

Note: This is only available in A758 Native Mode. If multiple logos are to be defined and used, this command should be preceded by the Select Current Logo Command to define the number by which this downloaded logo is to be referenced.

By default, A756 Emulation loads downloaded bit image to SRAM, while A758 Native Mode loads them to Flash.

See the illustration on the following page for a graphic representation of the downloaded bit image.



Exceptions:

See the illustration for the Print Downloaded Bit Image command (1D 2F) for a representation of the bit image.

Related Information:

See 1D 22 n (Select Memory Type to store logos) and 1D 23 n (Select the Current Logo.)

Print Downloaded Bit Image

ASCII: GS / *m*
Hexadecimal: 1D 2F *m*
Decimal: 29 47 *m*

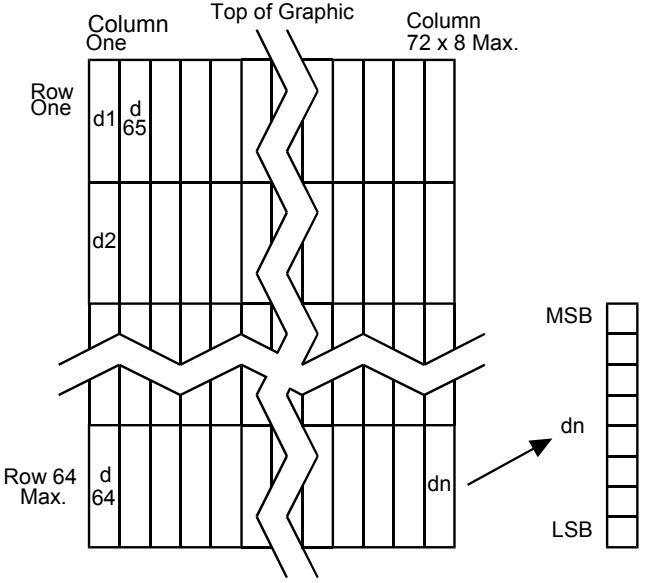
Value and Range of *m*:

Value of *m*	Print Mode	Vertical DPI[1]	Horizontal DPI*
0	Normal	203	203
1	Double Wide	203	101
2	Double High	101	203
3	Quadruple	101	101

[1]Dot density measured in dots per inch

Prints a downloaded bit image in RAM or Flash on the receipt station at a density specified by *m*. It is ignored if any data is in the print buffer, if the downloaded bit image is undefined, or if the data defined exceeds one line.

See the illustration for a representation of the bit image.



Related Information:

See 1D 22 n (Select Memory Type to store logos) and 1D 23 n (Select the Current Logo.)

Convert 6 Dots/mm Bitmap to 8 Dots/mm Bitmap

ASCII: AX EOT *n*
Hexadecimal: 1F 04 *n*
Decimal: 31 04 *n*

Value: 0 = Off
1 = On

Default: 0 (Off)

Selects or cancels 6 dot/mm in A756 Emulation Mode.

When the 6 dot/mm emulation is selected, logos and graphics are expanded horizontally and vertically to emulate their size on a 6 dot/mm printer. The horizontal positioning commands also emulate positioning on a 6 dot/mm printer.

Exception:

This command is available in A758 Native Mode only.

Status Commands

Status Command Introduction

The 7158 has three methods of providing status to the application. These methods are through Batch Status Commands, Real Time Status Commands, and Auto Status Back. An application may use one or more of these methods to understand the current status of the printer. A brief description of each of these methods follows.

Batch Status Commands – These commands are sent to the printer and stored in the printer's buffer. Once the printer has processed all the previous commands these commands are processed and the proper status is returned to the application. In the event a condition causes the printer to go BUSY, it stops processing commands from the printer buffer. If a Batch Status Command remained in the buffer during this busy condition, it would not be processed. In fact, no Batch Commands are processed while the printer is in this state.

Real-Time Commands – These commands are sent to the printer and are NOT stored in the printer's buffer. Instead, they are acted on immediately (regardless of the printer's BUSY status) and their response (if any) is returned to the application. This gives the application the ability to query the printer when it is in a busy state in order to correct whatever fault has occurred.

Auto Status Back – This mechanism allows the application developer to program the printer to automatically respond with a four byte status when certain conditions in the printer change.

Please see the subsequent sections for a more detailed description of these status commands. At the end of this Status Commands section is a page entitled "Recognizing Data from the Printer". This describes how to interpret what command or setting (in the case of Auto Status Back) triggered a response from the printer.

Batch Mode

For RS-232C printers, these commands enable the printer to communicate with the host computer following the selected handshaking protocol, either DTR/DSR or XON/XOFF. They are stored in the printer's data buffer as they are received, and are handled by the firmware in the order in which they are received.

When a fault occurs, the printer will go busy at the RS-232C interface and not respond to any of the Batch Mode Printer Status commands. If the fault causing the busy condition can be cleared, such as by loading paper, or letting the thermal printhead cool down, the printer will resume processing the data in its receive buffer.

Transmit Peripheral Device Status

ASCII: ESC u 0
Hexadecimal: 1B 75 0
Decimal: 27 117 0

	Bit 0	Bit 1
Return Value:	1 = Drawer 1 closed	1 = Drawer 2 closed
	0 = Drawer 1 open	0 = Drawer 2 open

(Bits 2-7 are not used)

Transmits current status of the cash drawers. One byte is sent to the host computer. In DTR/DSR protocol the printer waits for DSR = SPACE. If a drawer is not connected, the status will indicate it is closed.

Request Alternate Status (Parallel Only)

ASCII: ESC u *n*
Hexadecimal: 1B 75 *n*
Decimal: 27 117 *n*

Value and Range of *n*:

Value of *n*	Function	Description
00	Drawer 1	High = Open Low = Closed or Not Present
01	Drawer 2	High = Open Low = Closed or Not Present
02	Paper Low (Not Implemented. Interpreted as Paper Out.)	High = Paper Out Low = Paper Present
03	Paper Out (Default)	High = Paper Out Low = Paper Present
>03	Ignored, No Change	Printer Does Not Stay BUSY[1]

[1]PAPER EXHAUST LINE is valid to indicate previously requested status.

This command allows the printer to inform the host when the data in the buffer has been processed, when the IEEE 1284 interface is in unidirectional mode. When this command is sent to the printer, the printer goes "Busy" until all data which has been sent to the printer has been processed. The PAPER EXHAUST line shows the status for the cash drawer or receipt paper as shown in the table.

Status information is limited to what can be sent by the dedicated lines: BUSY, ACK, PAPER EXHAUST, and FAULT.

Transmit Printer Status

ASCII: ESC v
Hexadecimal: 1B 76
Decimal: 27 118

Sends status data to the host computer. The printer sends one byte to the host computer when it is not busy or in a fault condition. In DTR/DSR protocol, the printer waits for DSR = SPACE.

Status Byte (RS-232C)

Bit	Function	0 Signifies	1 Signifies
0	Receipt Paper	Ok	Low
1	Receipt Cover or Front Cover	Closed	Open
2	Receipt Paper	Ok	Out
3	Knife or Slip	Ok	Jam
4	Always Zero		
5	Slip Leading Edge Sensor	Not Covered	Covered
6	Slip Trailing Edge Sensor	Not Covered	Covered
7	Thermal Head Temp or voltage	Ok	Out of Range

Related Information:

See Real Time Commands, in this document for details about fault condition reporting.

Transmit Printer ID

ASCII GS I *n*
Hexadecimal 1D 49 *n*
Decimal 29 73 *n*

Value of *n* 1, 49 = Printer model ID
2, 50 = Type ID
3, 51 = ROM version ID

Transmits the printer ID specified by *n* as follows:

N	Printer ID	Specification	ID (hexadecimal)
1, 49	Printer model ID	NCR 7158	0x28 (A758 Native Mode)
1, 49	Printer model ID	NCR 7156	0x26 (A756 Emulation)
2, 50	Type ID	Installed options	Refer to the table below
3, 51	ROM version ID	ROM version	0x00
4, 52	Logo Definition	Logo Definition	Refer to table below

Type ID (n=2)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	No two-byte character code installed.
	On	01	1	Two-byte character code installed.
1	Off	00	0	No knife installed.
	On	02	2	Knife installed.
2	-	-	-	Undefined
3	Off	00	0	No MICR installed.
	On	08	8	MICR installed.
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to Off.

Type ID (n=4)

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	No logo definition loaded by application.
	On	01	1	Logo loaded by application.
1	-	-	-	Undefined
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to Off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to Off.

Transmit Printer ID, Remote Diagnostics Extension

ASCII: GS I @ *n*
Hexadecimal: 1D 49 40 *n*
Decimal: 29 73 64 *n*

Values of *n*: Refer to table

Range of *n*: 32 – 255
(not all defined but reserved)

Performs the remote diagnostic function specified by *n*.

Eighteen remote diagnostic items are defined: eight printer ID items and ten printer tally items. A group of four remote diagnostic functions is assigned to each diagnostic item. Most of the diagnostic items are maintained in non-volatile memory (NVRAM), but some are maintained in read-only memory (ROM).

The table that follows describes the variables.

The first item group in the table includes an example of data to send and to receive. Data sent from the host to write to NVRAM must contain all digits required by the remote diagnostic item. All data must be ASCII. The printer returns all ASCII data. It is preceded by the parameter *n* to identify the diagnostic item and is followed by a Carriage Return (0D) to signify the end of the data.

The command performs the remote diagnostic function specified by *n* as described in the following table.

Value of *n*			Remote Diagnostic Item	Function
ASC	Hex	Dec		
Space	20	32	Serial #, 10 digit ASCII	Write to NVRAM Example, send 14 bytes to printer: GS I @ 0x20 1234567890
!	21	33	Serial #	Write to NVRAM, and print on receipt to verify Example, send 14 bytes to printer: GS I @ ! 1234567890 This will print on receipt: Serial # written: 1234567890

Value of *n*			Remote Diagnostic Item	Function
ASC	Hex	Dec		
“	22	34	Serial #	Not available, cannot clear Serial # item
#	23	35	Serial #	Return Serial #, preceded by *n* to identify Printer returns 12 bytes in above example: #1234567890<CR>
$	24	36	Class/model #, 15 digit ASCII	Write to NVRAM
%	25	37	Class/model #	Write to NVRAM, and print on receipt to verify
‘	27	39	Class/model #	Return Class/model #, returns 17 bytes
+	2B	43	Boot firmware part #, 12 digit ASCII	Return Boot firmware part #, returns 14 bytes
/	2F	47	Boot firmware CRC, 4 digit ASCII	Return Boot firmware CRC, returns 6 bytes
3	33	51	Flash firmware part #, 12 digit ASCII	Return Flash firmware part #, returns 14 bytes
7	37	55	Flash firmware CRC, 4 digit ASCII	Return Flash firmware CRC, returns 6 bytes
Ç	80	128	Receipt lines tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM Example, send 12 bytes to printer: GS I @ Ç00010000 To set receipt lines tally to 10,000
ü	81	129	Receipt lines tally	Write to NVRAM, and print on receipt to verify Example, send 12 bytes to printer: GS I @ ü00010000 This will print on receipt: Receipt tally written: 10,000
é	82	130	Receipt lines tally	Clear receipt lines tally to 0

Value of *n*			Remote Diagnostic Item	Function
ASC	Hex	Dec		
â	83	131	Receipt lines tally	Return receipt lines tally, preceded by *n* to identify Printer returns 10 bytes in above example: â00010000<CR>
ä	84	132	Knife cut tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
à	85	133	Knife cut tally	Write to NVRAM, and print on receipt to verify
å	86	134	Knife cut tally	Clear knife cut tally to 0
ç	87	135	Knife cut tally	Return knife cut tally, returns 10 bytes
ê	88	136	Slip character tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
ë	89	137	Slip character tally	Write to NVRAM, and print on receipt to verify
è	8A	138	Slip character tally	Clear slip character tally to 0
ï	8B	139	Slip character tally	Return slip character tally, returns 10 bytes
î	8C	140	MICR read tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
ì	8D	141	MICR read tally	Write to NVRAM, and print on receipt to verify
Ä	8E	142	MICR read tally	Clear MICR read tally to 0
Å	8F	143	MICR read tally	Return MICR read tally, returns 10 bytes

Value of *n*			Remote Diagnostic Item	Function
ASC	Hex	Dec		
É	90	144	Hours on tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
æ	91	145	Hours on tally	Write to NVRAM, and print on receipt to verify
Æ	92	146	Hours on tally	Clear Hours on tally to 0
ô	93	147	Hours on tally	Return Hours on tally, returns 10 bytes
ù	97	151	Boot firmware version	Return Boot firmware version, returns 6 bytes
ú	A3	163	Flash firmware version	Return Flash firmware version, returns 6 bytes
ñ	A4	164	Flash cycles tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
Ñ	A5	165	Flash cycles tally	Write to NVRAM, and print on receipt to verify
a	A6	166	Flash cycles tally	Clear Flash cycles cut tally to 0
o	A7	167	Flash cycles tally	Return Flash cycles cut tally, returns 10 bytes
¿	A8	168	Knife jams tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
⌐	A9	169	Knife jams tally	Write to NVRAM, and print on receipt to verify
¬	AA	170	Knife jams tally	Clear Knife jams tally to 0
½	AB	171	Knife jams tally	Return Knife jams tally, returns 10 bytes
¼	AC	172	Cover openings tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM

Value of *n*			Remote Diagnostic Item	Function
ASC	Hex	Dec		
¡	AD	173	Cover openings tally	Write to NVRAM, and print on receipt to verify
«	AE	174	Cover openings tally	Clear Cover openings tally to 0
»	AF	175	Cover openings tally	Return Cover openings tally, returns 10 bytes
▒	B2	178	Max Temperature tally	Set Max temp tally to -273
▓	B3	179	Max Temperature tally	Return Max Temperature tally, returns 10 bytes
┤	B4	180	Slip lines tally, 8 digit ASCII numeric, max 99,999,999	Write to NVRAM
╡	B5	181	Slip lines tally	Write to NVRAM, and print on receipt to verify
╢	B6	182	Slip lines tally	Clear Slip lines tally to 0
╖	B7	183	Slip lines tally	Return Slip Lines tally, returns 10 bytes

Transmit Status

ASCII: GS r *n*
Hexadecimal: 1D 72 *n*
Decimal: 29 114 *n*

Value of *n*: 1, 49 = printer status
2, 50 = cash drawer status
3, 51 = slip paper status
4, 52 = Flash Memory status

Transmits the status specified by *n*. This is a batch mode command which transmits the response after all prior data in the receive buffer has been processed. There may be a time lag between the printer receiving this command and transmitting the response, depending on the receive buffer status.

When DTR/DSR RS232C communications handshaking control is selected, the printer transmits the one byte response only when the host signal DSR indicates it is ready to receive data.

When XON/XOFF RS232C communications handshaking control is selected, the printer transmits the one byte response regardless of the host signal DSR.

When Auto Status Back (ASB) is enabled using the Enable/Disable Automatic Status Back command (1D 61), the status transmitted by this command (Transmit Status) and the ASB status must be differentiated according to the information found in Recognizing Data from the Printer. This is found in the Real Time Commands section of this document.

The status bytes to be transmitted are described in the following four tables.

Printer Status (*n* = 1 or *n* = 49)

Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	Off	00	0	Receipt paper adequate.
	On	01	1	Receipt paper low.
1	Off	00	0	Receipt paper adequate.
	On	02	2	Receipt paper low.
2	Off	00	0	Receipt paper present.
	On	04	4	Receipt paper exhausted.
3	Off	00	0	Receipt paper present.
	On	08	8	Receipt paper exhausted.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	Slip leading edge sensor: paper present
	On	20	32	Slip leading edge sensor: no paper.
6	Off	00	0	Slip trailing edge sensor: paper present
	On	40	64	Slip trailing edge sensor: no paper.
7	Off	00	0	Not used. Fixed to off.

(Transmit Status—continued on the next page)

Cash Drawer Status (*n* = 2 or *n* = 50)

Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	Off	00	0	One or both cash drawers open.
	On	01	1	Both cash drawers closed.
1	Off	00	0	One or both cash drawers open.
	On	02	2	Both cash drawers closed.
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Slip Paper Status (*n* = 3 or *n* = 51)

Value of Byte Returned	Slip Status
0	There is no more printing space on the current slip, or the slip paper is not selected.
1 to 8	Remaining print area on the current slip, in number of lines, at the currently set line spacing, when the trailing edge sensor has become uncovered. Until the trailing edge sensor becomes uncovered the value reported will be 6, because there are at least 6 lines remaining. There can be 7 or 8 lines remaining when the slip line spacing has been set to less than 7.2 lines per inch.

Flash Memory Status (*n* = 4 or *n* = 52)

Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	Off	00	0	Undefined. Fixed to off.
1	Off	00	0	Undefined. Fixed to off.
2	Off On	00 04	0 4	User data storage write successful. User data storage write failed. Specified area not erased.
3	Off On	00 08	0 8	Flash logo area adequate. Definition stored. Flash logo area not adequate for recent definition.
4	Off	00	0	Not used. Fixed to off.
5	Off On	00 20	0 32	No thermal user-defined characters written to Flash Thermal user-defined characters written to Flash.
6	Off On	00 04	0 64	No impact user-defined characters written to Flash. Impact user-defined characters written to Flash.
7	Off	00	0	Not used. Fixed to off.

Range of *n*: 1 – 4
49 - 52

Exceptions:

When *n* is out of the specified range, the command is ignored.

Recognizing Data from the Printer

An application sending various Real Time and non-Real Time commands to which the printer responds can determine which command a response belongs to by the table below.

Responses to Transmit Peripheral Device Status (1B 75) and Transmit Paper Sensor Status (1B 76) are non-Real Time responses and will arrive in the order in which they were solicited.

Batch Mode Response		**Response Recognized By:**								
ASCII	**HEX**									
ESC u 0	1B 75 0	0	0	0	0	0	0	x	x	Binary
ESC v	1B 76	0	0	0	0	0	x	x	x	Binary
GS I *n*	1D 49 n	0	x	x	0	x	x	x	x	Binary
GS r *n*	1D 72 n	0	x	x	0	x	x	x	x	Binary

Real-Time Response		**Response Recognized By:**								
ASCII	**HEX**									
GS EOT *n*	1D 04 n	0	x	x	1	x	x	1	0	Binary
DLE EOT *n*	10 04 n	0	x	x	1	x	x	1	0	Binary
GS ENQ	1D 05	1	x	x	x	x	x	x	x	Binary
XON		0	0	0	1	0	0	0	1	Binary
XOFF		0	0	0	1	0	0	1	1	Binary

Auto Status Back (ASB)	**Response Recognized By:**								
ASB Byte 1	0	x	x	1	x	x	0	0	Binary
ASB Bytes 2-4	0	x	x	0	x	x	x	x	Binary

Real Time Commands

These commands provide an application interface to the printer even when the printer is not handling other commands (RS-232C communication interface only):

1. Real Time Status Transmission (GS Sequence and DLE Sequence)
2. Real Time Request to Printer (GS Sequence and DLE Sequence)
3. Real Time Printer Status Transmission

The Batch Mode Printer Status commands are placed in the printer's data buffer as they are received and handled by the firmware in the order in which they are received. If the paper exhausts while printing data that was in the buffer ahead of the status command, the printer goes busy at the RS-232C interface and suspends processing the data in the buffer until paper is reloaded. This is true for all error conditions: knife home error, slip paper jam, thermal printhead overheat, etc.

In addition, there is no way to restart the printer after a paper jam, or to cancel a slip waiting condition when using the Wait for Slip command.

The Real Time commands are implemented in two ways to correct these problems. Both implementations offer the same functionality; which one you choose depends on the current usage of your application.

Preferred Implementation

For a new application the GS (1D) sequences are recommended to avoid possible misinterpretation of a DLE (0x10) sequence as a Clear Printer (0x10 0, ASCII DLE NUL) command.

An application using these GS (1D) sequences, does not need to distinguish for the printer between the new real time commands and the Clear Printer command. This implementation is ideal for an existing 7156 application that already uses the Clear Printer command or for a new application being developed.

Alternate Implementation

The alternate implementation uses the DLE (0x10) sequences as implemented on other printers. An application using these DLE (0x10) sequences and the original 7156 Clear Printer command (0x10) must distinguish for the printer between the new real time commands and the Clear Printer command by adding a NUL (0x00) to the Clear Printer command.

An application using these DLE (0x10) sequences must also send the second byte of the sequence within 100 milliseconds of the first, to prevent the first byte being mistaken for a Clear Printer command.

Rules for Using Real Time Commands

Three situations must be understood when using real time commands.

First, the printer executes the Real Time command upon receiving it and will transmit status regardless of the condition of the DSR signal.

Second, the printer transmits status whenever it recognizes a Real Time Status Transmission command sequence, even if that sequence happens to occur naturally within the data of another command, such as graphics data.

In this case the sequence will also be handled correctly as the graphics data it is intended to be when the graphics command is executed from the buffer.

Third, care must be taken not to insert a Real Time command into the data sequence of another command that consists of two or more bytes.

In this case the printer will use the real time command sequence bytes instead of the other command's parameter bytes when finally executing that other command from the buffer; the other command will NOT be executed correctly.

These three situations generally preclude use of standard DOS drivers for the serial communication ports when using real time commands.

Moving Data Through the Buffer

Another consideration is that an application should take care not to let the buffer fill up with real time commands when the printer is busy at the RS-232C interface. A busy condition at the RS-232C interface can be determined by bit 3 of the response to 1D 05 or 1D 04 1 or 10 04 1. The reason for a particular busy condition can be determined by other responses to 1D 04 n or 10 04 n.

Although the printer responds to Real Time commands when it is busy, it will place them into the buffer behind any other data there, and flush them out in the order in which they were received. When the printer is busy due simply to buffer full (that is, it can't print data as fast as it can receive it), then data continues to be processed out of the buffer at approximately print speed and the Real Time commands will eventually get flushed out.

When the printer is busy due to an error condition, then data stops being processed out of the buffer until the condition clears one way or another. In either case, but more quickly in the case of an error condition, the buffer can fill with real time commands.

When the DLE sequences are being used, the last byte stored when the buffer fills up could be the DLE code, with no room for the subsequent EOT or ENQ. When this lone DLE byte is finally processed out of the buffer it will be interpreted as a Clear Printer command.

Similarly, when the GS sequences are being used, the last byte stored when the buffer fills up could be the GS code, with no room for the subsequent EOT or ETX or ENQ. When this lone GS byte is finally processed out of the buffer it will use the next byte, whatever it is, as the second byte in its GS sequence.

To guard against this situation, an application should determine the cause of a busy condition and take appropriate action or pace further real time commands to avoid filling the buffer. There are a minimum of 256 bytes available in the printer's buffer when it goes busy.

Real Time Status Transmission

	GS Sequence	DLE Sequence
ASCII:	GS EOT *n*	DLE EOT *n*
Hexadecimal:	1D 04 *n*	10 04 *n*
Decimal:	29 4 *n*	16 4 *n*

Value of *n*: GS/DLE Sequence

1 = Transmit printer status
2 = Transmit RS-232C busy status
3 = Transmit error status
4 = Transmit receipt paper status

5 = Slip paper status

Transmits the selected one byte printer status specified by *n* in Real Time according to the following parameters. This command includes two sequences: GS and DLE.

Exceptions:

The command is ignored if *n* is out of range.

An application using the DLE sequence must send EOT within 100 milliseconds of DLE or the printer will misinterpret the DLE and execute a Clear Printer command. Avoid this possibility by using the 1D 04 *n* sequence, which is handled exactly the same as 10 04 *n*.

Related Information:

1 = Transmit Printer Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	One or both cash drawers open
	On	04	4	Both cash drawers closed
3	Off	00	0	Not busy at the RS-232C interface
	On	08	8	Printer is Busy at the RS-232C interface
4	On	10	16	Fixed to On
5				Undefined
6				Undefined
7	Off	00	0	Fixed to Off

(Real Time Status Transmission—continued on the next page)

2 = Transmit RS-232C Busy Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	Both receipt and cassette doors closed
	On	04	4	Receipt or cassette door open
3	Off	00	0	Paper Feed Button is not pressed
	On	08	8	Paper Feed Button is pressed
4	On	10	16	Fixed to On
5	Off	00	0	Printing not stopped due to paper condition
	On	20	32	Printing stopped due to paper condition
6	Off	00	0	No error condition
	On	40	64	Error condition exists in the printer
7	Off	00	0	Fixed to Off

3 = Transmit Error Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	No slip motor or flip jam
	On	04	4	Slip motor or flip jam occurred
3	Off	00	0	No knife error
	On	08	8	Knife error occurred
4	On	10	16	Fixed to On
5	Off	00	0	No unrecoverable error
	On	20	32	Unrecoverable error occurred
6	Off	00	0	Thermal printhead temp./power supply voltage are in range
	On	40	64	Thermal printhead temp./power supply voltage are out of range
7	Off	00	0	Fixed to Off

(Real Time Status Transmission—continued on the next page)

4 = Transmit Receipt Paper Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	Receipt paper adequate
	On	04	4	Receipt paper low
3	Off	00	0	Receipt paper adequate
	On	08	8	Receipt paper low
4	On	10	16	Fixed to On
5	Off	00	0	Receipt paper present
	On	20	32	Receipt paper exhausted
6	Off	00	0	Receipt paper present
	On	40	64	Receipt paper exhausted
7	Off	00	0	Fixed to Off

5 = Transmit Slip Paper Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	Slip paper selected
	On	04	4	Receipt paper selected
3	Off	00	0	Not waiting for slip
	On	08	8	Waiting for slip
4	On	10	16	Fixed to On
5	Off	00	0	Slip leading edge sensor: paper preset Slip leading edge sensor: no paper
	On	20	32	
6	Off	00	0	Slip trailing edge sensor: paper preset Slip trailing edge sensor: no paper
	On	40	64	
7	Off	00	0	Fixed to Off

Real Time Request to Printer

	GS Sequence		DLE Sequence
ASCII:	GS ETX *n*	or	DLE ENQ *n*
Hexadecimal:	1D 03 *n*		or 10 05 *n*
Decimal:	29 3 *n*	or	16 5 *n*

Value of *n*: 1 = Recover and restart
2 = Recover and clear buffers
3 = Cancel slip waiting

The printer responds to a request from the host specified by *n*. This command includes two sequences: GS and DLE. The operations performed depend on the value of *n,* according to the following parameters.

***n* = 1:**

Restarts printing from the beginning of the line where an error occurred, after recovering from the error. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this command. This sequence is ignored except when the printer is busy due to an error condition.

If the receipt is selected, this command will attempt recovery from a knife error. Other errors associated with the receipt, such as paper out or printhead overheating, can be recovered from only by clearing the specific condition, such as loading paper or letting the printhead cool down.

If the slip is selected, this command will attempt recovery from a slip motor or flip jam by re-homing the printhead and waiting for a slip to be inserted before restarting the print. Other errors associated with the slip, such as cassette door open, can be recovered from only by clearing the specific condition, such as closing the cassette door.

***n* = 2:**

Recovers from an error after clearing the receive and print buffers. Print settings that are normally preserved from line to line, such as character height and width, are still preserved with this command. This sequence is ignored except when the printer is busy due to an error condition.

If the slip was selected when the error occurred, the receipt becomes selected when the buffers are cleared. When printing on the slip is to continue, the slip must be selected again.

The same error recovery possibilities exist as for *n* = 1.

***n* = 3:**

Cancels the slip waiting status. This sequence is ignored except when the printer is waiting for a slip to be inserted.

When slip waiting is canceled, the receive and print buffers are cleared and the receipt is selected. When printing on the slip is to continue, the slip must be selected again.

(Real Time Request to Printer—continued on the next page)

Exceptions:

The command is ignored if *n* is out of range

An application using the DLE sequence must send ENQ within 100 milliseconds of DLE or the printer will misinterpret the DLE and execute a Clear Printer command. Avoid this possibility by using the 1D 03 n sequence that is handled exactly the same as 10 05 n.

Real Time Printer Status Transmission

ASCII: GS ENQ
Hexadecimal: 1D 05
Decimal: 29 5

Transmits one byte status of the printer in real time.

Value of Byte:

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Receipt paper adequate
	On	01	1	Receipt paper low
1	Off	00	0	Receipt paper adequate
	On	02	2	Receipt paper low
2	Off	00	0	Both receipt and cassette doors closed
	On	04	4	Receipt or cassette door open
3	Off	00	0	Not busy at the RS-232C interface
	On	08	8	Printer is busy at the RS-232C interface
4	Off	00	0	One or both cash drawers open
	On	1	16	Both cash drawers closed
5	Off	00	0	Paper present at both slip sensors
	On	20	32	Paper not present at one or both slip sensors
6	Off	00	0	No error condition
	On	40	64	Error condition exists in the printer
7	On	80	128	Fixed to On

Auto Status Back

Select or Cancel Automatic Status Back

ASCII: GS a *n*
Hexadecimal: 1D 61 *n*
Decimal: 29 97 *n*

Value of *n*: Status of ASB

Enables or disables automatic status back (ASB) and specifies the status items. This command is a batch mode command; that is, it is processed after all prior data in the receive buffer has been processed. There may be a time lag between the printer receiving this command and changing the ASB response, depending on the receive buffer status.

If any of the status items listed are selected, ASB is enabled and the printer automatically transmits 4 status bytes whenever the selected status changes. If no status is selected, ASB is disabled. All four status bytes are transmitted without checking DSR.

If the error status is enabled, a change in the following conditions will trigger the ASB:

1. Cash Drawer
2. Receipt Cover
3. Knife Error
4. Out-of-Range Printhead Temperature
5. Out-of-Range Voltage
6. Paper Exhaust Status
7. Slip Paper

The bits of *n* are defined in the table.

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Cash drawer status disabled.
	On	01	1	Cash drawer status enabled.
1	Off	00	0	RS-232C Busy status disabled.
	On	02	2	RS-232C Busy status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	00	0	Receipt paper roll status disabled.
	On	08	8	Receipt paper roll status enabled.
4	-	-	-	Undefined
5	Off	00	0	Slip detector, slip paper status disabled.
	On	20	32	Slip detector, slip paper status enabled.
6	-	-	-	Undefined
7	-	-	-	Undefined

Default: 0 (ASB disabled)

(Select or Cancel Status Back—continued on the next page)

Exceptions

If *n* = 0, ASB is disabled.

Related Information

When Auto Status Back (ASB) is enabled using this command, the status transmitted by other commands and the ASB status are differentiated according to the information found in Recognizing Data from the printer, (in the Real Time Commands section in this chapter). The status bytes to be transmitted are described in the following four tables.

Byte 1 = printer information
Byte 2 = error information
Byte 3 = paper sensor information
Byte 4 = paper sensor information

First Byte (Printer Information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not used. Fixed to off.
1	Off	00	0	Not used. Fixed to off.
2	Off	00	0	One or both cash drawers open.
	On	04	4	Both cash drawers closed.
3	Off	00	0	Not Busy at the RS232C interface.
	On	08	8	Printer is Busy at the RS232C interface.
4	On	10	16	Not used. Fixed to on.
5	Off	00	0	Receipt cover closed.
	On	20	32	Receipt cover open.
6	Off	00	0	Paper Feed Button is not pressed.
	On	40	64	Paper Feed Button is pressed.
7	Off	00	0	Not used. Fixed to off.

(Select or Cancel Status Back—continued on the next page)

Second Byte (Error information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	-	-	-	Undefined
1	-	-	-	Undefined
2	Off	00	0	No Mechanical Error
	On	04	4	Mechanical Error Occurred
3	Off	00	0	No knife error.
	On	08	8	Knife error occurred.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	No recoverable error occurred
	On	40	64	Recoverable error occurred: Receipt cover open Cassette cover open Receipt paper exhausted Thermal printhead temp out of range. Power supply voltage out of range.
7	Off	00	0	Not used. Fixed to off.

Third Byte (Paper Sensor Information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Receipt paper adequate
	On	01	1	Receipt paper low
1	Off	00	0	Receipt paper adequate
	On	02	2	Receipt paper low
2	Off	00	0	Receipt paper present.
	On	04	4	Receipt paper exhausted.
3	Off	00	0	Receipt paper present
	On	08	8	Receipt paper exhausted
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	Slip leading edge sensor: paper present
	On	20	32	Slip leading edge sensor: no paper
6	Off	00	0	Slip trailing edge sensor: paper preset
	On	40	64	Slip trailing edge sensor: no paper.
7	Off	00	0	Not used. Fixed to off.

(Select or Cancel Status Back—continued on the next page)

Fourth Byte (Paper Sensor Information)

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Slip paper selected
	On	01	1	Receipt paper selected
1	Off	00	0	Possible to print in slip
	On	02	2	Not possible to print on slip because no form has been inserted
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Bar Code Commands

These commands format and print bar codes and are described in order of their hexadecimal codes.

Note: 7156 firmware can be set for module widths in bar codes ranging from 2 dots to 4 dots per module (DPM) for the narrow modules. The default is 3 DPM.
7158 firmware ranges from 1 dot per module to 5 dots per module (DPM) printed on the receipt. The default is 2 DPM.

Select Printing Position for HRI Characters

ASCII: GS H *n*
Hexadecimal: 1D 48 *n*
Decimal: 29 72 *n*

Value of *n*: Printing position

0 = Not printed
1 = Above the bar code
2 = Below the bar code
3 = Both above and below the bar code

Default: 0 (Not printed)

Prints HRI (Human Readable Interface) characters above or below the bar code.

Select Pitch for HRI Characters

ASCII: GS f *n*
Hexadecimal: 1D 66 *n*
Decimal: 29 102 *n*

Value of *n*: Pitch
0 = Standard Pitch at 15.2 CPI on receipt
1 = Compressed Pitch at 19 CPI on receipt

Default: 0 (Standard Pitch at 15.2 CPI)

Selects standard or compressed font for printing Bar Code characters.

When slip is selected as the interface, HRI is always compressed.

Select Bar Code Height

ASCII: GS h *n*
Hexadecimal: 1D 68 *n*
Decimal: 29 104 *n*

Value of *n*: Number of dots

Range of *n*: 1 - 255

Default: 162

Sets the bar code height to *n* dots or *n*/8 mm (*n*/203 inch) for receipt or *n*/8.5 mm (*n*/216 inch) for slip.

Print Bar Code

	First Variation	Second Variation
ASCII:	GS k *m d1…dk* NUL	or GS k *m n d1…dn*
Hexadecimal:	1D 6B *m d1…dk* 00	or 1D 6B *m n d1…dn*
Decimal:	29 107 *m d1…dk* 0	or 29 107 *m n d1…dn*

0 = End of command.

Values:

First Variation: String terminated with NUL Character

m = 0 – 6, 10
d = 32 - 126 (see the table)
n = 1 - 255 (see the table)

Selects the bar code type and prints a bar code for the ASCII characters entered. If the width of the bar code exceeds one line, the barcode is not printed.

There are two variations to this command. The first variation uses a NUL character to terminate the string; the second uses a length byte at the beginning of the string to compensate for the Code 128 bar code, which can accept a NUL character as part of the data. With the second variation the length of byte is specified at the beginning of the string.

Fixed-length codes can be aligned left, center, or right using the Align Positions command (1B 61). Variable-length codes are always center aligned in A756 Emulation.

The check digit is calculated for UPC and JAN (EAN) codes if it is not sent from the host computer. Six-character zero-suppressed UPC-E tags are generated from full 11 or 12 characters sent from the host computer according to standard UPC-E rules. Start/Stop characters are added for Code 39 if they are not included.

m	Bar Code	D	n, Length
0	UPC-A	48- 57 (ASCII numerals)	Fixed Length: 11, 12
1	UPC-E	48- 57	Fixed Length: 11, 12
2	JAN13 (EAN)	48- 57	Fixed Length: 12, 13
3	JAN8 (EAN)	48- 57	Fixed Length: 7, 8
4	Code 39	48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) *d1* = *dk* = 42 (start/stop code is supplied by printer if necessary)	Variable Length
5	Interleaved 2 of 5	48- 57	Variable Length (Even Number)
6	Codabar	65- 68, start code 48- 57, 36, 43, 45, 46, 47, 58	Variable Length
10	PDF 417	1-255	Variable Length A758 Native Mode

(Print Bar Code--continued on the next page)

Second Variation: Length of Byte Specified at Beginning of String

m = 65 - 73, 75 (see the table)
d = 0 - 127 (see the table)
n = 1 - 255 (see the table)

The value of *m* selects the bar code system as described in the table. When data is present in the print buffer, the printer processes the data following *m* as normal data. The variable *d* indicates the character code to be encoded into the specified bar code system. See the table. If character code *d* cannot be encoded, the printer prints the bar code data processed so far, and the following data is treated as normal data.

m	Bar Code	D	n, Length
65	UPC-A	48- 57 (ASCII numerals)	Fixed Length: 11, 12
66	UPC-E	48- 57	Fixed Length: 11, 12
67	JAN13 (EAN)	48- 57	Fixed Length: 12, 13
68	JAN8 (EAN)	48- 57	Fixed Length: 7, 8
69	CODE 39	48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) *d1* = *dn* = 42 (start/stop code is supplied by printer if necessary)	Variable
70	Interleaved 2 of 5 (ITF)	48- 57	Variable (Even Number)
71	CODABAR (NW-7)	65- 68, start code 48- 57, 36, 43, 45, 46, 47, 58	Variable
72	Code 93	48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) *d1* = *d*n = 42 (start/stop code is supplied by printer if necessary)	Variable (A758 Native Mode only)
73	Code 128	0-105 *d1* = 103-105 (must be a Start code) *d2* = 0-102 (data bytes) (Stop code is provided by the printer)	Variable
75	PDF417	0 – 255	Variable Length (A758 Native Mode only)

Exceptions:

Illegal data cancels this command.

The command is valid only at the beginning of a line.

PDF 417 format cannot be printed on the slip.

Barcodes on the Slip are always right justified.

PDF417 and Code 93 are only available in A758 Native Mode.

Select Bar Code Width

ASCII: GS w *n*
Hexadecimal: 1D 77 *n*
Decimal: 29 119 *n*

Value of *n*: 1, 2, 3, 4, 5

Default : 3 for receipt; 2 for slip

Sets the bar code width to *n* dots.

Formulas:

n + *1*/8 mm (*n* + *1*/203 inch) for receipt, n + 1/5.7 mm (n + 1/144 inch) for slip.

Slip module sizing: *n* must be even (it is rounded up if odd) and the size of modules is n + 1/5.7 mm (n + 1/144 inch).

Page Mode Commands

Page Mode is one of two modes, which the 7158 printer uses to operate. Standard Mode is typical of how most printers operate by printing data as it is received and feeding paper as the various paper feed commands are received. Page Mode is different in that it processes or prepares the data as a "page" in memory before it prints it. Think of this as a virtual page. The page can be any area within certain parameters that you define. Once the printer receives the (0x0C) command, it prints the page and returns the printer to Standard Mode.

The Select Page Mode command (1B 4C) puts the printer into Page Mode. Any commands that are received are interpreted as Page Mode commands. Several commands react differently when in Standard Mode and Page Mode. The descriptions of these individual commands in this chapter indicate the differences in how they operate in the two modes.

Limitations

Page mode is only implemented on the receipt station in A758 Native Mode only.

Print and Return to Standard Mode

ASCII: FF
Hexadecimal: 0C
Decimal: 12

The processed data is printed and the printer returns to Standard Mode. The developed data is deleted after being printed. This command has the same code as the Print and Eject Slip command, which is executed when the printer is not in Page Mode.

Exceptions:

This command is enabled only in Page Mode.

Cancel Print Data in Page Mode

ASCII: CAN
Hexadecimal: 18
Decimal: 24

Deletes all the data to be printed in the "page" area. Any data from the previously selected "page" area that is also part of the current data to be printed is deleted.

This command has the same code as the Open Form command, which is performed when the printer is not in Page Mode.

Exceptions:

This command is only used in Page Mode.

Print Data in Page Mode

ASCII: ESC FF
Hexadecimal: 1B 0C
Decimal: 27 12

Collectively prints all buffered data in the printing area.

After printing, the printer does not clear the buffered data and sets values for Select Print Direction in Page Mode (1B 54 n) and Set Print Area in Page Mode (1B 57…), and sets the position for buffering character data.

Exceptions:

This command enabled only in Page Mode.

Select Page Mode

ASCII: ESC L
Hexadecimal: 1B 4C
Decimal: 27 76

Switches from Standard Mode to Page Mode. After printing has been completed either by the Print and Return to Standard Mode (FF) command or Select Standard Mode (1B 53) the printer returns to Standard Mode. The developed data is deleted after being printed.

This command sets the position where data is buffered to the position specified by Select Print Direction in Page Mode (1B 54) within the printing area defined by Set Print Area in Page Mode (1B 57).

This command switches the settings for the following commands (which values can be set independently in Standard Mode and Page Mode) to those for Page Mode.

1. Set Right-Side Character Spacing (1B 20)
2. Select 1/6-Inch Line Spacing (1B 32)
3. Set Line Spacing (1B 33)

   It is possible only to set values for the following commands in Page Mode. These commands are not executed.
4. Select or Cancel 90 Degree Clockwise Rotation (1B 56)
5. Select Justification (1B 61)
6. Select or Cancel Upside-Down Printing (1B 7B).
7. Set Left Margin (1D 4C)
8. Set Print Area Width (1D 57)

Exceptions:

The command is enabled only when input at the beginning of a line. The command is available only when the receipt is selected by Select Paper (1B 63 30). The command has no effect if Page Mode has previously been selected. The Select Paper (1B 63 30) command can not be used in Page Mode. In A756 Emulation Mode, (1B 4C…) is used for double density graphics.

Select Standard Mode

ASCII: ESC S
Hexadecimal: 1B 53
Decimal: 27 83

Switches from Page Mode to Standard Mode. In switching from Page Mode to Standard Mode, data buffered in Page Mode are cleared, the printing area set by Set Print Area in Page Mode (1B 57) is initialized and the print position is set to the beginning of the line.

This command switches the settings for the following commands (the values for these commands can be set independently in Standard Mode and Page Mode) to those for Standard Mode:

1. Set Right-Side Character Spacing (1B 20)
2. Select 1/6 Inch Line Spacing (1B 32)
3. Set Line Spacing (1B 33)

Standard Mode is automatically selected when power is turned on, the printer is reset, or the Initialize Printer command (1B 40) is used.

Exceptions:

This command is effective only in Page Mode.

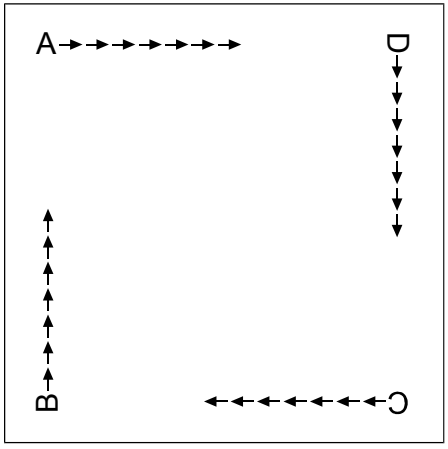
Select Print Direction in Page Mode

ASCII: ESC T *n*
Hexadecimal: 1B 54 *n*
Decimal: 27 84 *n*

Value of *n*: Start position

Selects the printing direction and start position in Page Mode. See the illustration.

0 = Upper left corner proceeding across page to the right (A)
1 = Lower left corner proceeding up the page (B)
2 = Lower right corner proceeding across page to the left (upside down) (C)
3 = Upper right corner proceeding down page (D)



Default: 0 (Upper left corner proceeding across page to the right)

The command can be sent multiple times so that several different print areas, aligned in different print directions, can be developed in the printer's page buffer before being printed by the Eject Slip command (0C).

Exceptions:
This command is valid only in Page Mode. This command is ignored if the value of *n* is out of the specified range.

Set Printing Area in Page Mode

ASCII: ESC W *n1, n2 ...n8*.]
Hexadecimal: 1B 57 *n1, n2 ...n8]*
Decimal: 27 87 *n1,n2 ...n8]*

Range: 0 - 255

Default: *n1-4* = 0
n5 = 64
n6 = 2
n7 = 64
n8 = 2

Sets the position and size of the printing area in Page Mode.

The command can be sent multiple times so that several different print areas, aligned in different print directions, can be developed in the printer's page buffer before being printed by the Eject Slip command (0C).

Defaults equal an origin of 0,0 and a size of 576x576. This command is allowed in any mode.

Formulas:

The starting position of the print area is the upper left of the area to be printed (x0, y0). The length of the area to be printed in the y direction is set to dy inches. The length of the area to be printed in the x direction is set to dx inches. Use the equations to determine the Value of x0, y0, dx, and dy.

See the illustration for a graphic representation of the printing area. For more information about the fundamental calculation pitch, see the Set Fundamental Calculation Pitch command (1D 50).

1. x0 = [(*n*1 + *n*2 x 256) x (horizontal direction of the fundamental calculation pitch)]
2. y0 = [(*n*3 + *n*4 x 256) x (vertical direction of the fundamental calculation pitch)]
3. dx = [(*n*5 + *n*6 x 256) x (horizontal direction of the fundamental calculation pitch)]

4. dy = [(*n*7 + *n*8 x 256) x (vertical direction of the fundamental calculation pitch)]

   Keep the following notes in mind for this command.

5. The fundamental calculation pitch depends on the vertical or horizontal direction.
6. The maximum printable area in the x direction is 576/203 inches.
7. The maximum printable area in the y direction is 2000/203 inches.

Exception:

This command is effective only in Page Mode.

Set Absolute Vertical Print Position in Page Mode

ASCII: GS $ *nL nH*
Hexadecimal: 1D 24 *nL nH*
Decimal: 29 36 *nL nH*

Formulas:

[(*nL* + *nH* X 256) x (vertical or horizontal motion unit)] inches.

Sets the absolute vertical print starting position for buffer character data in
Page Mode.

The vertical or horizontal motion unit for the paper roll is used and the horizontal starting buffer position does not move.

The reference starting position is set by Select Print Direction in Page Mode
(1B 54). This sets the absolute position in the vertical direction when the starting position is set to the upper left or lower right; and sets the absolute position in the horizontal direction when the starting position is set to the upper right or lower left. The horizontal and vertical motion unit are specified by the Set Horizontal and Vertical Minimum Motion Units (1D 50) command.

The Set Horizontal and Vertical Minimum Motion Units (1D 50) command can be used to change the horizontal and vertical motion unit. However, the value cannot be less than the minimum horizontal movement amount, and it must be in even units of the minimum horizontal movement amount.

Exceptions:

This command is effective only in Page Mode.

If the [(*nL* + *nH* x 256) x (vertical or horizontal motion unit)] exceeds the specified printing area, this command is ignored.

Set Relative Vertical Print Position in Page Mode

ASCII: GS \ *nL nH*
Hexadecimal: 1D 5C *nL nH*
Decimal: 29 92 *nL nH*

Sets the relative vertical print starting position from the current position. This command can also change the horizontal and vertical motion unit. The unit of horizontal and vertical motion is specified by this command.

This command functions as follows, depending on the print starting position set by Select Print Direction in Page Mode (1B 54):

- When the starting position is set to the upper left or lower left of the printing area, the vertical motion unit (*y*) is used.
- When the starting position is set to the upper right or lower left of the printing area, the horizontal motion unit (*x)* is used.

Value:

The value for the horizontal and vertical movement cannot be less than the minimum horizontal movement amount, and must be in even units of the minimum horizontal movement amount.

Formulas:

The distance from the current position is set to [(*nL* + *nH* x 256) x vertical or horizontal motion unit] inches. The amount of movement is calculated only for the receipt.

When pitch *n* is specified to the movement downward:

nL + nH x 256 = *n*

When pitch *n* is specified to the movement upward (the negative direction), use the complement of 65536.

When pitch *n* is specified to the movement upward:

nL + nH x 256 – 65536 – *N*

Exceptions:

This command is used only in Page Mode, otherwise it is ignored.

Any setting that exceeds the specified printing area is ignored.

Macro Commands

These commands are used to select and perform a user-defined sequence of printer operations.

Start or End Macro Definition

ASCII: GS :
Hexadecimal: 1D 3A
Decimal: 29 58

Starts or ends macro definition. Macro definition begins when this command is received during normal operation and ends when this command is received during macro definition. The macro definition is cleared, during definition of the macro, when the Execute Macro (1D 5E) command is received.

Normal printing occurs while the macro is defined. When the power is turned on the macro is not defined.

The defined contents of the macro are not cleared by the Initialize Printer (1B 40), thus, the Initialize Printer (1B 40) command may be used as part of the macro definition.

If the printer receives a second Select or Cancel Macro Definition (1D 3A) command immediately after previously receiving a Select or Cancel Macro Definition (1D 3A) the printer remains in the macro undefined state.

Formulas:

The contents of the macro can be defined up to 2048 bytes.

Exceptions:

If the macro definition exceeds 2048 bytes, excess data is not stored.

This command is available in A758 Native Mode only.

Execute Macro

ASCII: GS ^ *r t m*
Hexadecimal: 1D 5E *r t m*
Decimal: 29 94 *r t m*

Value of *r*: The number of times to execute the macro.
Value of *t*: The waiting time for executing the macro.

Executes a macro. After waiting for a specified period the LED indicators blink and the printer waits for the Paper Feed Button to be pressed. After the button is pressed, the printer executes the macro once. The printer repeats this operation the number of specified times.

When the macro is executed by pressing the Paper Feed Button (*m* = 1), paper cannot be fed by using the Paper Feed Button.

Formulas:

The waiting time is *t* x 100 msec for every macro execution.

m specifies macro executing mode when the LSB (Least significant bit) *m* = 0

The macro executes *r* times continuously at the interval specified by *t* when the LSB (Least significant bit) of *m* = 1.

Exceptions:

If this command is received while a macro is being defined, the macro definition is aborted and the definition is cleared.

If the macro is not defined or if *r* is 0, nothing is executed.

This command is available in A758 Native Mode only.

MICR Commands

MICR Reading

These commands control the Magnetic Ink Character Recognition (MICR) check reader, including how it parses the character strings on checks.

The section, MICR Parsing, describes how to create a parsing format and how to create and maintain an Exceptions table.

Read MICR Data and Transmit

ASCII: ESC w 1
Hexadecimal: 1B 77 01
Decimal: 27 119 1

Default: All data returned

Reads and transmits the MICR data and adds a Carriage Return (0x0D). If no parsing format is selected with either of the Define Parsing Format commands (see below), all data will be returned, which is the default.

Reread MICR Data

ASCII: ESC w R
Hexadecimal: 1B 77 52
Decimal: 27 119 82

Resends the previously decoded MICR data to the host.

MICR Parsing

This section describes MICR parsing in detail and includes several examples of useful parsing variations. It also describes how to create a parsing format and how to create and maintain an exception table.

Define Parsing Format, Save in NVRAM

ASCII: ESC w P *d1 d2 … dn 0D*
Hexadecimal: 1B 77 50 *d1 d2 … dn 0D*
Decimal: 27 119 80 *d1 d2 … dn 0D*

Defines and saves parsing format. See Parsing Parameter String Options in this document. Send with this command the parse data that is to be the default parse string at printer power-up. If no parameters are selected, parsing is not performed.

d1 through dn are the parse string. The string must be CR terminated. If the string has invalid characters in it or is too long, the printer will store a null string, and raw MICR data will be returned.

Define Parsing Format, Do Not Save Permanently

ASCII: ESC w p
Hexadecimal: 1B 77 70
Decimal: 27 119 112

Defines, but does not save parsing format. See Parsing Parameter String Options in this document. Send this command as often as desired to change the previous parse format string. The data sent with 1B 77 50 will be restored at power-up.

Exceptions:

If no parameters are selected, parsing is not performed.

Parsing Parameter String Options

Variable Length Fields

Variable Length Field Name	Selector	Comments
Transit Number	T	Full 9 digit routing/transit number
Bank Number	B	Digits 4-8 of transit number
Check Digit	D	Digit 9 of transit number
Account Number	A	
Check Serial Number	C	Separate from account number
Amount	$	This field may not be present or readable

Variable Length Field Optional Modifiers	Selector	Comments
Zero fill to length	0	ASCII zero preceding maximum length
Maximum length	nn	1- or 2-digit ASCII number
Remove space/dash	X	
Replace space/dash with 0	x	

Examples of Variable Length Field Format Specifications	
Account #, all characters in the field, keep spaces and dashes	A
Account #, all characters in the field, replace spaces and dashes	xA
Account #, maximum 12 characters, keep spaces and dashes	12A
Account #, always 12 characters zero filled, remove spaces and dashes	012XA

(Parsing Parameter String Options—continued on the next page)

Other Parameters

Error Number	E	One Digit Returned	
		0	Read OK
		1	Read error: bad character, empty field invalid length, check digit invalid

Status	S	Two Digits Returned	
		01	No MICR data
		09	Mexican check
		08	Canadian check
		05	Error in transit number
		07	Error in account number
		04	Error in check serial number
		10	Business or commercial check
		11	Amount field present
		00	No error

Field Separator	'x	
		Field separator preceded by a single quote, so a field separator of the letter A would be sent as 'A (0x27 0x41). If a Carriage Return is specified as a separator (0x27 0x0D), a final Carriage Return must still terminate the parsing parameter string.

Country Code	Un	One Digit Returned	
		N	returned if US check
		Nothing	returned if not US check

Country Code	Km	One Digit Returned	
		M	returned if Canadian check
		Nothing	returned if not Canadian check

Check Type	L	One Digit Returned	
		1	Personal check
		2	Business or commercial check

Ten parameters are more than enough to specify all variable length fields with a field separator each and other status information that may be helpful to an application. More than 10 parameters are not recommended because they use up space in non-volatile memory (NVRAM) available for the exception table.

The parsing parameter string is stored packed in NVRAM starting at word 10, with the total byte length stored in the high order byte of word 10. While most parameters take two bytes of NVRAM, the following parameters take only one byte: B, D, E, S, L. None of the parsing examples in the following section take more than 14 bytes (seven words) of NVRAM.

The exception table starts at word 20. If the parsing parameter string extends into word 20, then the first exception table entry is unavailable.

Sample Parsing Formats

The following strings show various sample formats that you can use assuming they meet your parsing format needs. Included with the sample format is a description of the data that is returned to the application.

ESC w p 18 A <CR>

- Maximum 18 characters in the account number
- Final Carriage Return

ESC w p 18 X A <CR>

- Maximum 18 characters in the account number with spaces and dashes removed
- Final Carriage Return

ESC w p 18 x A <CR>

- Maximum 18 characters in the account number with spaces and dashes replaced with 0
- Final Carriage Return

ESC w p 018 A <CR>

- Always 18 characters in the account number (high order zero-filled if necessary)
- Final Carriage Return

ESC w p 018 X A <CR>

- Always 18 characters in the account number with spaces and dashes removed
- Final Carriage Return

ESC w p 018 x A <CR>

- Always 18 characters in the account number with spaces and dashes replaced with 0
- Final Carriage Return

ESC w p T 18 X A 04C <CR>

- All characters in the transit number
- All characters in the account number (up to 18) with spaces and dashes removed
- Always four characters in the check number (zero-filled if check number is only three characters long)
- Final Carriage Return

ESC w p K9 X T 18 X A 04C <CR>

- U.S. check: all nine characters in the transit number (because there are no dashes)
- Canadian check: dash in transit number removed; "9" inserted at beginning, resulting in a fully numeric nine character transit number
- All characters in the account number (up to 18) with spaces and dashes removed
- Always four characters in the check number (zero-filled if check number is only three characters long)
- Final Carriage Return

ESC w p T '/ A '/ C '/ S <CR>

- All characters in the transit number
- Field separator: /
- All characters in the account number
- Field separator: /
- All characters in the check number
- Field separator: /
- Two-digit status
- Final Carriage Return

Notes

All parameters are ASCII characters, i.e. greater than or equal to 0x20, with the exception of a non-ASCII character enclosed in single quotes as a field separator. This applies both to parameter specifications sent from application to printer, and to MICR data returned from printer to application.

Parameters are positional; their order in the parameter string is the order in which the parsed MICR data will be returned. Unrecognized parameters will be ignored, and processing of the parsing parameters will stop. Any data remaining after the unrecognized parameter will be treated as normal input data.

If parameters are not defined (for example, 1B 77 50 <CR> or 1B 77 70 <CR>) parsing is not selected. One status byte followed by all decoded MICR characters will be returned. This is the default parsing format if no other is selected:

Status	Status Byte Value
Good read, data follows	0x00
Bad read, data follows	0x01
No check present, no data	0x02
Paper jam, no data	0x03
No MICR characters, no data	0x04

MICR Characters	ASCII	Hexadecimal
Numerics	0...9	0x30...0x39
Unrecognized Character	?	0x3F
Space		0x20
Amount symbol	&	0x26
Dash symbol	'	0x27
“on us” symbol	(	0x28
Transit symbol	)	0x29

Once a parsing format is specified, the following values are returned:

MICR Characters	ASCII	Hexadecimal
Numerics	0...9	0x30...0x39
Space		0x20
Dash	-	0x2D
Field separator*		
Country code*		

*As specified in the parsing parameter string

Check Serial Number

Parsing the Check Serial Number

Most banks print the check serial number in three easily recognizable spots. The printer firmware will look for the number in these spots, using the following ordered algorithm. The examples use letters to represent symbols on the check:

t	Transit symbol
o	"on us" symbol
$	Amount symbol
-	Dash
c	Check serial number
x	Any other number

A number bracketed by "on us" symbols in the auxiliary "on us" field is the check serial number.

```
occccccо txxxxxxxxxt xxxxxxxxo
```

Otherwise, a three or more digit number to the right of the rightmost "on us" symbol, and to the left of the leftmost amount symbol if an amount field is present, is the check serial number.

```
txxxxxxxxxt xxxxxxxxo cccc
txxxxxxxxxt xxxxxxxxo cccc $xxxxxx$
```

If both of these searches fail to produce the check serial number, extract the whole account number field from between the rightmost transit symbol and the rightmost "on us" symbol. A three, four, or five-digit number to the right of the rightmost transit symbol, separated by a space or a dash from the rest of the account number is the check serial number.

```
txxxxxxxxxt cccc xxxxxxxxo
txxxxxxxxxt cccc-xxxxxxxxo
txxxxxxxxxt cccc xxxxxxxxo xx
```

If all of these searches fail to produce the distinct check serial number, and the check serial number field has been specified in the parsing parameter string options, no check serial number will be returned. If it is imbedded within the account number field, it will be returned as part of that variable length field.

Exceptions

Some banks print the check serial number in a location that cannot be electronically distinguished without specific exception information, although it can be visually distinguished because it is repeated in the upper right corner of the check. For these cases, the printer can hold up to nine exceptions for specific banks in its non-volatile memory (NVRAM), which is accessed by the read and write NVRAM commands. The specific bank is picked out by its transit number, and the firmware will look in the exception table for a transit number match before looking in the normal check serial number locations.

In this example, without an exception table entry, the firmware would always pick the rightmost four-digit number as the check serial number following rule two above. The bank with the three digit check serial number and the four digit extension after the "on us" symbol would need to be exceptionally recognized:

```
txxxxxxxxxt ccc-xxxxxxxxxxoxxxx
txxxxxxxxxt xxx-xxxxxxxxxxoxxxx
```

In this example, without an exception table entry, the firmware would not be able to pick out the check serial number because it is not separated from the rest of the account number:

```
txxxxxxxxxt ccccxxxxxxxxxxo
```

In this example, without an exception table entry, the firmware would not be able to pick out the check serial number correctly, because it is imbedded within the rest of the account number:

```
txxxxxxxxxt xxx-ccc-xxxxxxxxxxo
```

Loading the Exception Table

The exception table begins at word 20 in NVRAM. Each entry takes five words. There is room for eight exceptions with a sumcheck written in the last word. An application can load local exceptions into the printer using the write NVRAM command:

0x1B 0x73 n1 n2 k

which writes the two byte word n1:n2 to word k in NVRAM.

Exception Table Entry Format

Each exception table entry consists of five words. The first two words contain the first eight characters of the transit number by packing the low order nibble of the numeric transit number characters. For Canadian checks, eliminate the dash and store the eight numerics.

The next three words are used as six individual bytes to tell the firmware how to interpret the MICR characters that fall to the right of the rightmost transit symbol. Each of the six bytes is positional and consists of two parts: character type and number.

The three high order bits of each byte mark the character type. The characters can be marked in three ways: check serial # character, account # character, or "skip this character or symbol."

The five low order bits of each byte contain the number of characters of that type to extract. Most exceptions will not need to use all six bytes; in that case clear the unused bytes to zero.

Bits within Byte	7	6	5	4	3	2	1	0
check serial # character string	0	0	1	n	n	n	n	n
account # character string	0	1	0	n	n	n	n	n
character string to ignore	1	0	0	n	n	n	n	n

Example 1

t123456780t12349876543210o 1234 is the check serial #
9876543210 is the account #

To load the second table entry, which starts at word 25, the transit number 123456780 would be stored in the first two words of its table entry using this string of commands:

0x1B 0x73 0x12 0x34 25
0x1B 0x73 0x56 0x78 26

After the right transit symbol are immediately the four characters of the check serial #, followed immediately by the ten characters of the account number. These would be bitwise encoded as:

0 0 1 0 0 1 0 0 (check #, four characters)
and 0 1 0 0 1 0 1 0 (account #, 10 characters)

then stored in the other three words of the table entry using:

0x1B 0x73 0x24 0x4A 27
0x1B 0x73 0x00 0x00 28
0x1B 0x73 0x00 0x00 29

Example 2

t22137-632t001 6042202o927540 2754 is the check serial #
6042202 is the account #

To load the third table entry, which starts at word 30, the transit number 2137-632 would be stored in the first two words of its table entry using this string of commands:

0x1B 0x73 0x22 0x13 30
0x1B 0x73 0x76 0x32 31

After the right transit symbol are four characters to skip, a seven digit account number, two characters to skip, and finally a four digit check serial #. The final character to skip need not be encoded. These would be bitwise encoded as:

1 0 0 0 0 1 0 0 (skip four characters)
0 1 0 0 0 1 1 1 (account #, seven characters)
1 0 0 0 0 0 1 0 (skip two characters)
0 0 1 0 0 1 0 0 (check #, four characters)

then stored in the other three words of the table entry using:

0x1B 0x73 0x84 0x47 32
0x1B 0x73 0x82 0x24 33
0x1B 0x73 0x00 0x00 34.

Maintaining the Exception Table

Present contents of the exception table can be examined using the read NVRAM command:

0x1B 0x6A k

which reads and returns word k in NVRAM. When the exception table is full, a new entry can replace an older, less frequently used entry, by merely rewriting the words for that table entry.

Check Flip Command

Check Flip Command

ASCII: ESC w F
Hexadecimal: 1B 77 46
Decimal: 27 119 70

Causes a check on the slip table to be fed into the printer, flipped and left with the trailing edge of the check in the slip feed rollers. Prior to the flip, the check is measured to see that it is of an appropriate size (see Chapter 4: Media and Supplies, Forms Specification) to be flipped. If not, the check is fed back to the user.

Exception:

This command is available only in A758 Native Mode.

User Data Storage Commands

Write to User Data Storage

ASCII: ESC ' m a0 a1 a2 d1 ... dm
Hexadecimal: 1B 27 m a0 a1 a2 d1 ... dm
Decimal: 27 39 m a0 a1 a2 d1 ... dm

Value of m: 0 – 255

Writes m bytes of data to the User Data Storage Flash Page at the address specified. The printer waits for m bytes of data following the 3-byte address, addr.

If any of the memory locations addressed by this command are not currently erased, the command is not executed.

Read from User Data Storage

ASCII: ESC 4 *m a0 a1 a2*
Hexadecimal: 1B 34 *m a0 a1 a2*
Decimal: 27 52 *m a0 a1 a2*

Value of *m*: 0 – 255

Reads *m* bytes of data from the User Data Storage Flash Page at the address specified.

Read from Non-Volatile Memory

ASCII: ESC j *k*
Hexadecimal: 1B 6A *k*
Decimal: 27 106 *k*

Range of *k*: 20 – 63 (decimal)

Reads a two-byte word from location *k* in the history EEROM. The printer returns the word at the next available opportunity.

Write to Non-Volatile Memory (NVRAM)

ASCII: ESC s *n*1 *n*2 *k*
Hexadecimal: 1B 73 *n*1 *n*2 *k*
Decimal: 27 115 *n*1 *n*2 *k*

Value of *n1* : 1st Byte

Value of *n2* : 2nd Byte

Range of *k* : 20 - 63 (decimal locations)

Writes the two-byte word, *n*1 *n*2, to location *k* in history EEROM.

Select Memory Type (SRAM/Flash) Where to Save Logos or User-Defined Fonts

ASCII: GS " *n*
Hexadecimal: 1D 22 *n*
Decimal: 29 34 *n*

Value of *n*: 48 - 51

Specifies whether to load the logos or user-defined characters to Flash Memory or to RAM (volatile memory). The selection remains in effect until it is changed via this command or until the power cycles.

n = 48 (ASCII *n* = 0)

Loads active logo to RAM only. This is used to print a special logo but not have it take up Flash Memory. A logo defined following this command is not preserved over a power cycle.

n = 49 (ASCII *n* = 1)

Loads active logo to Flash Memory. This is the default condition for logo Flash storage. A logo defined following this command is stored in Flash Memory.

n = 50 (ASCII *n* = 2)

Loads user-defined characters to RAM only. This is the default condition for user-defined character storage. Any user-defined characters defined following this command are not preserved over a power cycle.

n = 51 (ASCII *n* = 3)

Loads user-defined characters to Flash Memory. An application must use this command to store user-defined characters in Flash Memory. Any user-defined characters defined following this command are stored in Flash Memory. A user-defined character cannot be redefined in Flash Memory. The Flash Memory page must be erased by an application before redefining user-defined characters. For more information, see the Erase User Flash Sector (1D 40 *n*) command.

Flash Allocation

ASCII: GS " U *n1 n*
Hexadecimal: 1D 22 55 *n1 n2*
Decimal: 29 34 85 *n1 n2*

Default Value of *n1*: 1 (see below)
Default Value of *n2*: 1 (see below)

n1 is the number of 64k sectors used for logos and user-defined characters.
n2 is the number of 64k sectors used for user data storage.

This command sets the allocation of Flash sectors between user data storage and logos/user-defined characters. This allocation is saved in the EEPROM of the printer and is therefore saved across power cycles.

n1 + n2 <= 2 (512K)
n1 + n2 <= 10 (1M)
n1 + n2 <= 18 (2M)

The 7158 has been configured at the factory with 512K, 1M or 2M of Flash memory. If n1 + n2 is greater than the maximum number of sectors available, the command is ignored. Reissuing this command with different parameters will erase all sectors.

Exception:

This is command is available only in A758 Native Mode

Erase User Flash Sector

ASCII: GS @ *n*
Hexadecimal: 1D 40 *n*
Decimal: 29 64 *n*

Value of *n*: 49 - 50

Erases a page of Flash Memory and sends a carriage return when the operation is complete.

n = 49 (ASCII *n* = 1)

This command erases all sectors available for user-defined characters and multiple logos. The page should be erased in two situations: when the logo definition area is full and an application is attempting to define new logos, and when an application wants to replace one user-defined character set with another. In both cases, all logos and character set definitions are erased and must be redefined.

n = 50 (ASCII *n* = 2)

This command erases all sectors available for user data storage.

Important:

While erasing Flash Memory, the printer disables all interrupts, including communications. To provide feedback to the application, the printer responds to the application when the erase is complete. After sending the Erase User Flash Sector (1D 40 *n*) command, an application should wait for the response from the printer before sending data. Otherwise, data will be lost. If an application is unable to receive data, it should wait a minimum of five seconds after sending the Erase User Flash Sector (1D 40 *n*) command before sending data.

Flash Download Commands

These commands are used to load firmware into the printer.

The commands are listed in numerical order according to their hexadecimal codes. Each command is described and the hexadecimal, decimal, and ASCII codes are listed.

There are three ways to enter the Download Mode.

1. Powering the printer up with DIP Switch 1 up.
2. While the printer is running normally, use the command Switch to Flash Download Mode, to leave normal operation and enter the Download Mode.
3. If the Flash if found corrupted during Level 0 diagnostics the Download Mode is automatically entered after the printer has reset.

The printer never goes directly from the Download Mode to normal printer operation. To return to normal printer operation either the operator must turn the power off and then on to reboot or the application must send a command to cancel Download Mode and reboot.

Switch to Flash Download Mode

ASCII: ESC [}
Hexadecimal: 1B 5B 7D
Decimal: 27 91 125

Puts the printer in Flash Download Mode in preparation to receive commands controlling the downloading of objects into Flash Memory. When this command is received, the printer leaves normal operation and can no longer print transactions until the Reboot the Printer command (1D FF) is received or the printer is rebooted.

This command does not affect the current communication parameters. Once the printer is in Flash Download Mode, this command is no longer available.

Request Printer ID

ASCII: GS NUL
Hexadecimal: 1D 00
Decimal: 29 0

Returns ACK (06 hex) + 12 bytes ASCII string describing the Flash Memory Boot Sector Firmware part number. Ex : 189-1234567A

Return Segment Number Status of Flash Memory

ASCII: GS SOH
Hexadecimal: 1D 01
Decimal: 29 1

Returns the size of the Flash used. There may be 8, 16, or 32 sectors (64K each) in Flash Memory. This command assures that the firmware to be downloaded is the appropriate size for Flash Memory. The value returned is the maximum sector number that can be accepted by the Select Sector to Download (1D 02 *n*) command.

Exceptions:

Available only in Download Mode.

Select Flash Memory Sector to Download

ASCII: GS STX *n*
Hexadecimal: 1D 02 *n*
Decimal: 29 2 *n*

Value of *n*: the Flash sector to which the next download operation applies

Range of *n*: 0 – 7 (512K)
0 – 15 (1 mB)
0 – 31 (2 mB)

Selects the Flash sector (nn) for which the next download operation applies. The values of the possible sector are restricted, depending upon the Flash part type. The printer transmits an ACK if the sector number is acceptable or an NAK if the sector number is not acceptable. Sector numbers start at 0.

Exceptions:

Available only in Download Mode.

Get Firmware CRC

ASCII: GS ACK
Hexadecimal: 1D 06
Decimal: 29 6

Causes the printer to calculate the CRC for the currently selected sector and transmits the result. This is performed normally after downloading a sector to verify that the downloaded firmware is correct. The printer also calculates the CRC for each sector during power up and halts the program if any sector is erroneous.

The printer transmits ACK if the calculated CRC is correct for the selected sector; NAK if the CRC is incorrect or if no sector is selected.

Return Microprocessor CRC

ASCII: GS BEL
Hexadecimal: 1D 07
Decimal: 29 7

Returns the CRC calculated over the boot sector code space.

Formulas:

ACK <low byte> <high byte>

Erase the Flash Memory

ASCII: GS SO
Hexadecimal: 1D 0E
Decimal: 29 14

Causes the entire Flash Memory (except the boot) to be erased. The printer returns ACK if the command is successful; NAK if it is unsuccessful.

Exceptions:

Available only in Download Mode.

Return Main Program Flash CRC

ASCII: GS SI
Hexadecimal: 1D 0F
Decimal: 29 15

Returns the CRC calculated over the Flash firmware code space. The format of the response is ACK <low byte> <high byte>.

Erase Selected Flash Sector

ASCII: GS DLE *n*
Hexadecimal: 1D 10 *n*
Decimal: 29 16 *n*

Value and Range of *n*:

0 – 7 = 512K bytes Flash
0 – 15 = 1M bytes Flash
0 – 31 = 2M bytes Flash

Erases the previously selected sector. The printer transmits ACK when the sector has been erased. If the previous sector is not successfully erased, or if no sector was selected, the printer transmits NAK.

Exceptions:

Available only in Download Mode.

Download to Active Flash Sector

ASCII: GS DC1 al ah cl ch d1…dn
Hexadecimal: 1D 11 al ah cl ch d1…dn
Decimal: 29 17 al ah cl ch d1…dn

Value of al = low byte of the address
Value of ah = high byte of the address
Value of cl = low byte of the count
Value of ch = high byte of the count
Value of d = data bytes, from 1 to n

Contains a start address (ah * 256 + al) and count (ch * 256 + cl) of binary bytes to load into the selected sector, followed by that many bytes. The start address is relative to the start of the sector. Addresses run from 0 to 64K.

The printer may return one of several responses. ACK means that the data was written correctly and the host should transmit the next block. NAK means that, for some reason, the data was not written correctly. This could mean that communications failed or that the write to Flash failed. The alternatives seem to be to retry the block or halt loading and assume a hardware failure.

Value of *n* (for number of data bytes)	Range of Address (*al ah*)	Range of Count (*cl ch*)
((ch * 256) + cl)	2000-FFFF (hexadecimal)	0001-0400 (hexadecimal)

Range: Addresses run from 0 to 64K.

Related Information:

Available only in Download Mode.

Reboot the Printer

ASCII: GS (SPACE)
Hexadecimal: 1D FF
Decimal: 29 255

Ends the load process and reboots the printer. Before executing this command, the printer should have firmware loaded and external switches set to the runtime settings. Application software for downloading should prompt the user to set the external switches and confirm before sending this command. If the downloading was started from a diagnostic, the reboot will cause the printer to reenter download state unless the external switches are changed.

Chapter 8: Universal Serial Bus

About the Universal Serial Bus

The Universal Serial Bus (USB) is a peripheral bus for personal computers that was first released in January 1996. Since that time, virtually all Intel Architecture personal computers have the hardware to support USB, and a large number of computers exist that have both the hardware and software support required to interface with USB peripherals.

Advantages of USB connections

USB has a number of advantages over legacy connection schemes (e.g., serial RS-232). These advantages include:

- High Speed: up to 12 MB/second for high-speed devices.
- Plug and Play: Devices are automatically recognized and configured at installation.
- Hot plug: Bus supports installation and removal of devices with the power applied.
- Up to 127 devices: One host can support up to 127 devices with the use of hubs.
- "Free ports": Most PC architecture machines contain two USB ports in the base hardware.

These advantages have become attractive to the POS industry for a couple of reasons.

Additional POS devices. Some POS systems are required to host more peripherals than can be supported by two RS-232 ports typical in a platform. With the addition of one (or two) USB connectors, the platform can now support the additional devices that had previously required a serial port expander card.

Higher bandwidths. New devices coming into use have bandwidth requirements that are higher than the bandwidth that can be supported on legacy interfaces. These devices include image scanners and printers. As the speed and capability of POS printers increases, the performance of the printer in an application can become limited by the speed of the communications interface. USB provides ample bandwidth to support current and future POS printer requirements.

Advantages of the NCR USB Solution

NCR has eliminated any cost associated with porting applications to USB by implementing a USB solution that simulates standard serial communications in Windows 95 (OSR2.1), 98, and NT 4.0 (Service Pack 3 or higher). Application developers need only redirect their software to the virtual serial ports created by the NCR USB solution to use the printer.

Checking for USB Support on the Host Computer

To make USB work, the POS must be factory equipped with a USB port. With the required hardware in place, Windows 98 and 95 (OS R2.1) natively support plug-and-play USB with a built-in driver; Windows NT does not, and the NCR Windows NT USB driver needs to be installed.

IMPORTANT: You need LPIN D370-1111-0100 oad the appropriate drivers for the USB printers.

Host Configuration

Verify that the proper hardware has been installed in the host PC.

Windows 95 and 98:

1. Open the Control Panel.
2. Click on System (Windows 98) or System Properties (Windows 95).

   The Windows 95 operating system version should read 4.00.950 B. If your system is not current, you'll need to upgrade to either Windows 95 OSR2.1 or Windows 98 before proceeding.
3. Click the Device Manager tab.
4. In the Device Manager window, scroll down the list of installed hardware devices until you find an entry for "Universal serial bus controller."

If this entry exists, your host computer is set up for USB operation. If this entry does not appear:

- You need to install Windows 95 USB supplement.

Windows NT:

To see if your POS terminal is USB-compliant, look at the back.

- If it has a USB connector port, your hardware is all set.

Note: Even though the host may have a USB port, Windows NT does not natively support plug-and-play USB because it does not have a built-in driver. You will need to load the NCR Windows NT USB driver (see "Installing the USB Printer Drivers").

Configuring NCR POS Printers for USB

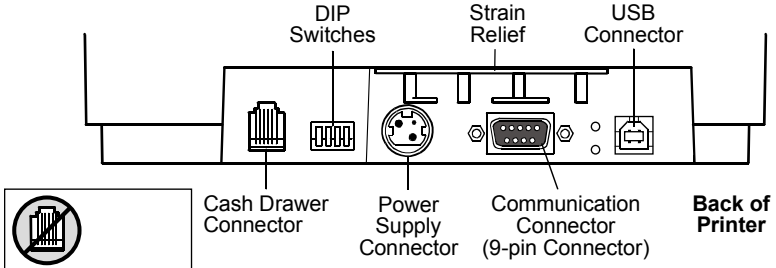
Installing the NCR 7158 USB Upgrade Kit

If you're upgrading the printer, you may need to upgrade the firmware and must install a USB Board. If your printer is factory configured for USB, proceed to "Configuring the Printer."

To update the firmware:

Update the boot and flash versions of the printer's firmware to communicate with the USB connector prior to installing the new USB board.

1. You need to obtain Part Number 497-0417??.
2. Unplug the printer's power cable.



CAUTION:
DO NOT plug the USB Cable into the Cash Drawer Connector.

3. Flip DIP switch No.1 on the back of the printer to the On (up) position.

   This puts the printer into download mode.
4. Plug the printer's power cable back in. The LED blinks quickly.
5. Open the readme file, and follow the directions.
6. Unplug the power cable again.

7. Return DIP switch No.1 to the original Off (down) position.
8. When you're finished, plug the printer in again. The LED remains on without blinking.

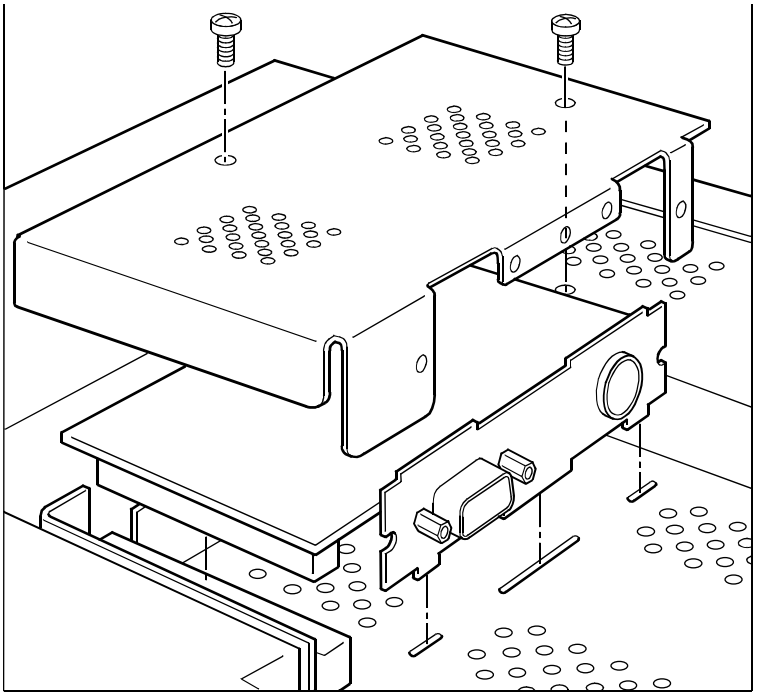
The printer is now operational. You can print out a diagnostics form to verify that the boot and flash versions of the firmware have been updated. (See *Owners Manual* for printing the diagnostic form.)

To remove the Options Board and install the USB Board:

You'll need a No.1 Phillips screwdriver to complete this task.

Warning: Electrostatic discharge could damage the USB Board. Wear a grounded wrist strap and use a static mat or other ESD protected work surface when handling electronic components.

1. Starting with the power cable, disconnect all cables from the printer.
2. Turn the printer over onto its top.
3. Remove the two screws that secure the Top PCB Cover (Options PCB Cage) and pull the cover up and off.



4. Remove the Options Board by gripping it at the connector end and lifting up. You may need to wiggle it slightly back and forth as you pull.
5. Firmly seat the USB Board onto the Controller Board (where you just removed the Options Board) by carefully aligning the connectors and pushing the USB Board down into place.
6. Replace the Top PCB Cover (Options PCB Cage) over the USB Board.
7. Using the screws removed earlier, fasten the cover in place.
8. Return the printer to its upright position and plug only the power cable back into the printer. The LED remains on without blinking.

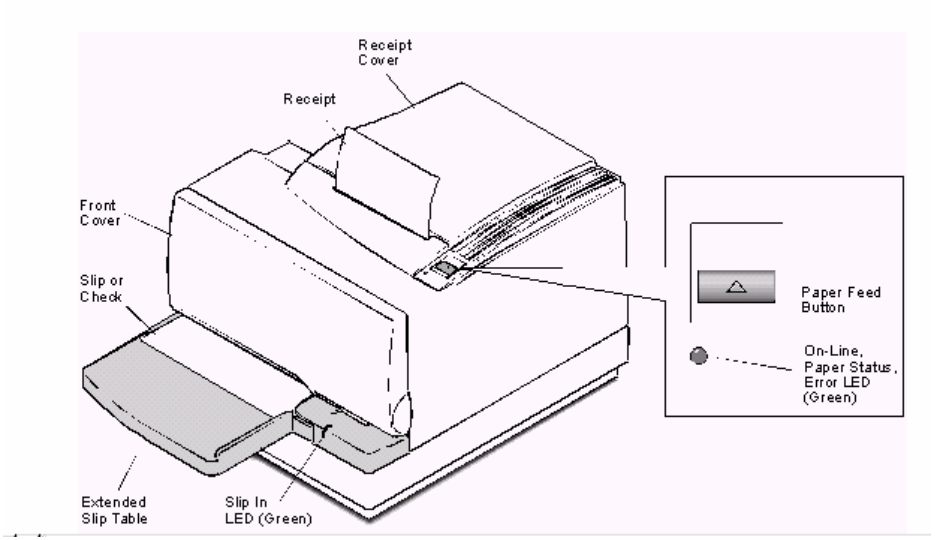
Configuring the Printer

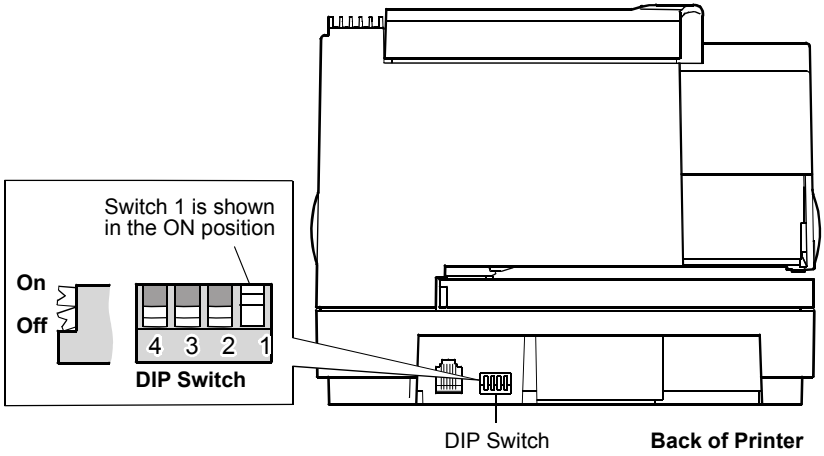
USB is a plug-and-play environment. As such, neither the printer nor the host requires user configuration to work. However, since the NCR solution simulates a serial communication interface, you must configure "handshaking" on the printer for proper operation. The printer can be configured to use hardware flow control (using DTR/DSR) or software flow control (using XON/XOFF). All other serial communication parameters (i.e., baud rate, parity, stop bits, and data bits) are ignored.

To define software or hardware handshaking:

1. Open the Receipt Cover and check whether there is paper in the printer. If there isn't, insert the paper roll, as described in the *Owner's Manual*.
2. Turn the printer so the back is facing you.

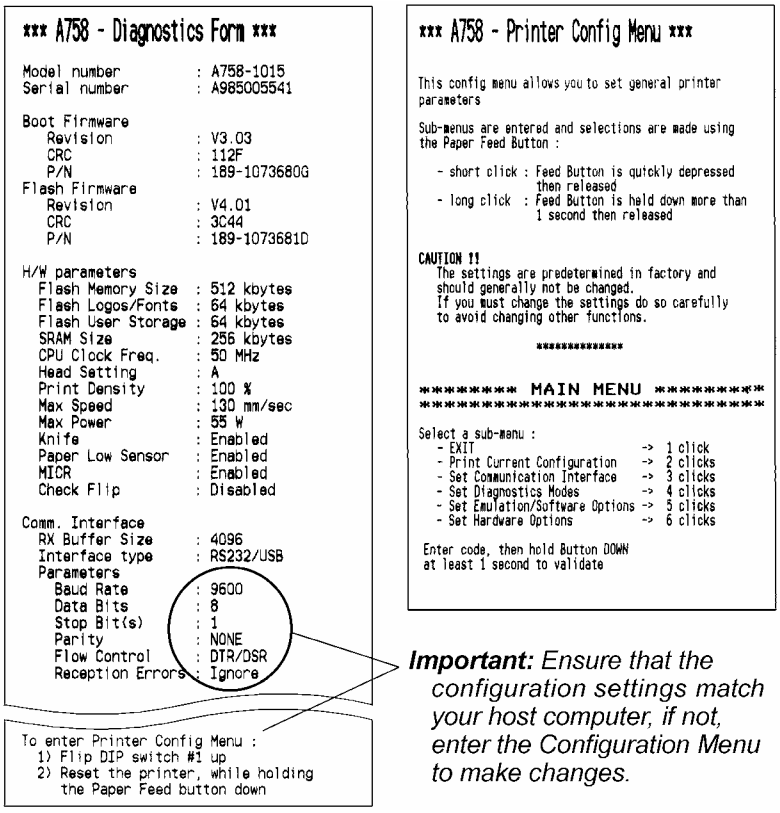
Set DIP switch 1 to the On position (up).





3. Open the Front Cover of the printer and press the Reset button, while pressing the Paper Feed button.

The printer beeps, prints the current configuration, then waits for you to make a selection from the Main Menu on the printout.


*** A758 - Diagnostics Form ***
Model number : A758-1015
Serial number : A985005541
Boot Firmware
Revision : V3.03
CRC : 112F
P/N : 189-1073680G
Flash Firmware
Revision : V4.01
CRC : 3C44
P/N : 189-1073681D
H/W parameters
Flash Memory Size : 512 kbytes
Flash Logos/Fonts : 64 kbytes
Flash User Storage : 64 kbytes
SRAM Size : 256 kbytes
CPU Clock Freq. : 50 MHz
Head Setting : A
Print Density : 100 %
Max Speed : 130 mm/sec
Max Power : 55 W
Knife : Enabled
Paper Low Sensor : Enabled
MICR : Enabled
Check Flip : Disabled
Comm. Interface
RX Buffer Size : 4096
Interface type : RS232/USB
Parameters
Baud Rate : 9600
Data Bits : 8
Stop Bit(s) : 1
Parity : NONE
Flow Control : DTR/DSR
Reception Errors : Ignore
To enter Printer Config Menu :
1) Flip DIP switch #1 up
2) Reset the printer, while holding
the Paper Feed button down
*** A758 - Printer Config Menu ***
This config menu allows you to set general printer parameters
Sub-menus are entered and selections are made using the Paper Feed Button :
- short click : Feed Button is quickly depressed then released
- long click : Feed Button is held down more than 1 second then released
CAUTION !!
The settings are predetermined in factory and should generally not be changed.
If you must change the settings do so carefully to avoid changing other functions.
****
********** MAIN MENU **********
Select a sub-menu :
- EXIT -> 1 click
- Print Current Configuration -> 2 clicks
- Set Communication Interface -> 3 clicks
- Set Diagnostics Modes -> 4 clicks
- Set Emulation/Software Options -> 5 clicks
- Set Hardware Options -> 6 clicks
Enter code, then hold Button DOWN at least 1 second to validate

Important: *Ensure that the configuration settings match your host computer, if not, enter the Configuration Menu to make changes.*

Follow the instructions on the scrolling menu, pressing the Paper Feed button to make selections. Indicate Yes with a long click, and No with a short click.

- Press and hold the Paper Feed button for at least one second for a long click.
- Press the Paper Feed button quickly for a short click.

5. Select Set Communication Interface from the Main Menu.

   The printer scrolls to the first question.

6. Select RS232/USB.
7. Skip through the parameters with short clicks until Set Flow Control Method is displayed.

8. Follow the instructions to select either XON/OFF or DTR/DSR, then skip the remaining communications parameters.
9. When you have finished, set DIP switch 1 to Off (down).
10. Press the Reset button.

The printer resets with the new selection. You can verify the new setting by pressing the Paper Feed button to print out a diagnostics form or by holding the Paper Feed button while closing the Top Cover.

Installing the USB Printer Drivers

You must have LPIN D370-1111-0100 To install the required drivers to support the USB printers

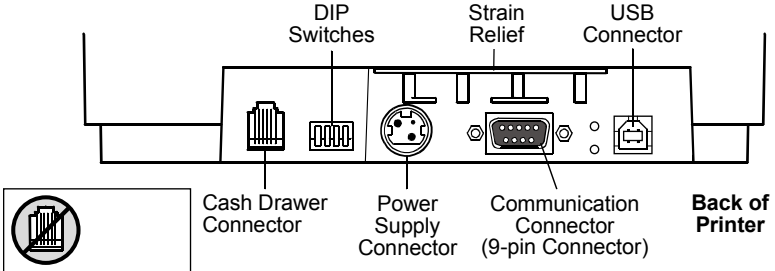
Note: NT users should exit out of all Windows programs before starting installation.

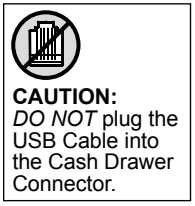
Load from NCR LPIN D370-1111-0100

1. Insert disk into the host.
2. Double click on the Drivers icon.
1. Follow the on-screen instructions.

Installing the Drivers

Warning: When instructed to connect the USB cable from the host to the printer, be careful to plug it into the USB Board connector only. Do not insert the USB cable into the Cash Drawer connector on the right back of the printer. Damage to the printer could occur. If you are not sure of your printer configuration, contact NCR before proceeding.



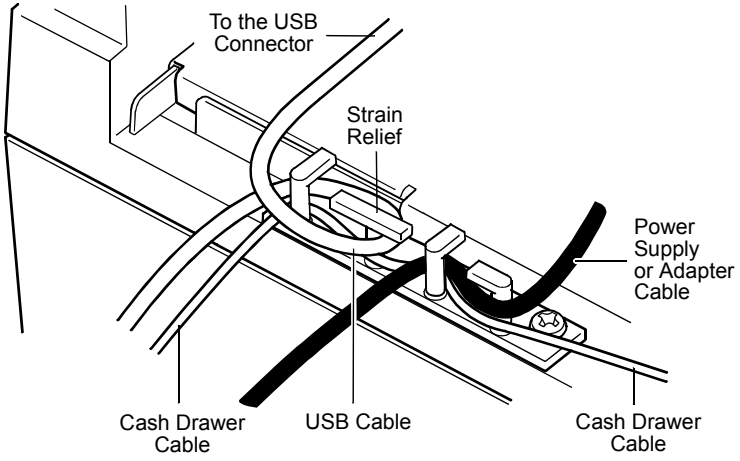


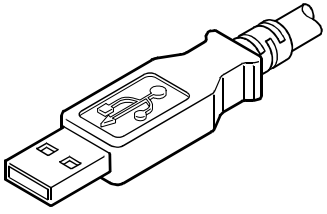
Note: Windows NT users will need to be running Service Pack 3 or higher for a successful installation.

1. Verify that the printer is plugged in and the power is on.

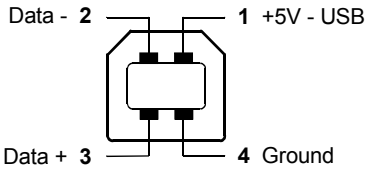
2. To start the installation program, plug one end of the USB cable into the USB connector port on the printer. Route the cable from the printer, as shown, to provide strain relief and plug the other end into the host computer. Make sure the USB symbol on the connector is facing up when you plug it in.

USB Cable Strain Relief





PC end of USB Cable



Pinouts of Printer end of USB Cable

3. The installation will vary depending on the operating system.

- *Windows 95 and 98:*

  Follow the on-screen instructions. The printer beeps when the USB device has been recognized.

- *Windows NT:*

  The printer beeps when it is plugged in to show the USB device has been recognized. Click on the file you just downloaded, then follow the on-screen instructions.

Checking the Installation

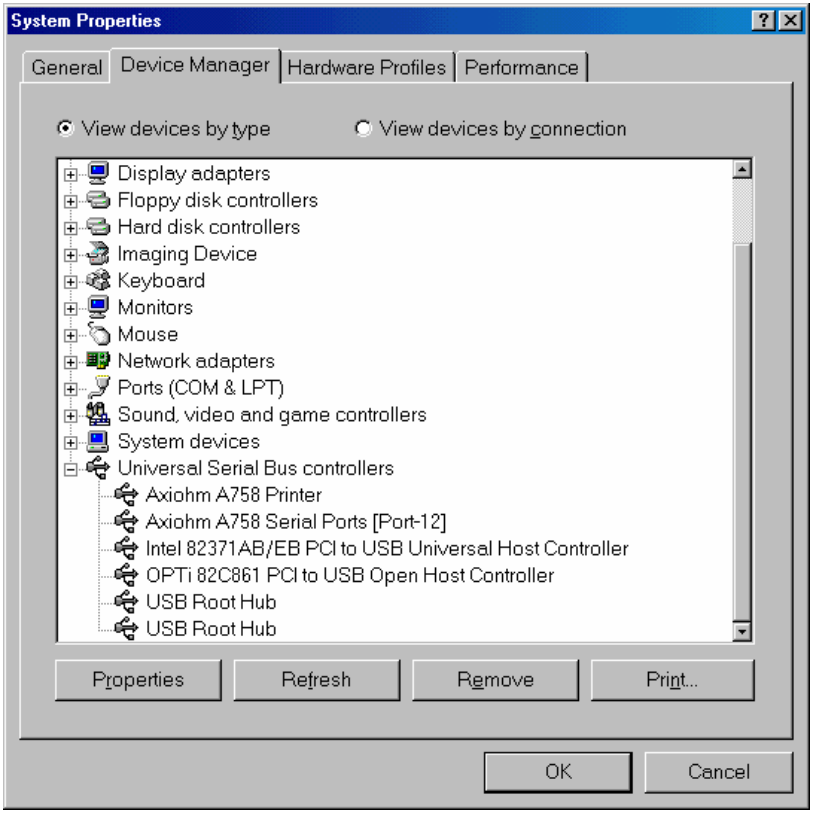
You'll need to verify that the device drivers were installed correctly:

Windows 95 and 98:

1. Open the Device Manager window, as you did in "Checking for USB Support."
2. Scroll down to "Universal serial bus controllers."

   The following devices should be displayed:

   - **NCR** 7158 Printer
   - **NCR** 7158 Serial Ports [Port#] (where the # is the location of the printer)



3. Scroll back up to “Ports.”

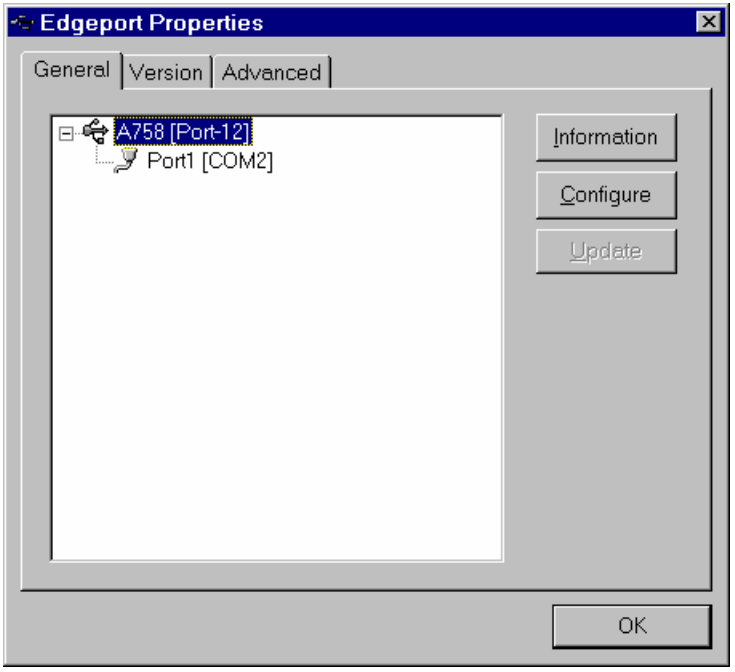
You should see a COM number and port description for the **NCR** printer.

If the devices are missing or are not listed correctly, the installation wasn’t successful. You will need to reinstall the drivers.

Windows NT:

Go the Windows Start button and select Programs > InsideOut Networks Utilities > Edgeport Configuration Utility. A window opens that contains the name of the printer, and the port assignment.

If this information is not listed, then the installation was not successful. You will need to reinstall the drivers.



Configuring Serial Port Number Assignments

This section described how the **NCR** USB solution assigns serial port numbers (e.g., COM*x*) to the printer. The information that determines the assigned port number is stored in the host computer and not in the printer. This assignment is made in one of three ways. The first method is the default method that automatically assigns a serial port number to the printer. The other two methods require the user to specify a port number. These methods are described more fully in "Serial Port Configuration Methods" on the following page.

Running the Edgeport Utility

You'll need to run the Edgeport utility to check which serial port has been assigned to the printer. This utility queries and configures the operating system and driver for the information regarding the virtual serial port.

Windows 95/98

1. Open the Device Manager and make sure "View Devices By Type" is selected.
2. Scroll down to Universal serial bus controller, and expand the list by pressing the "+" symbol. You'll see two entries for your **NCR** printer.
3. Select the printer name and click Properties.
4. Select the Details tab, then press the Details button to start the Edgeport utility.

Windows NT 4.0

From the Windows Start menu, select Programs > Inside Out Networks Utilities > Edgeport Configuration Utility.

Serial Port Configuration Methods

Automatic (Default). When the printer is plugged into the USB port of the host and the drivers are loaded, the printer will default to the next available serial port number. In many cases this is exactly what is desired. You can check the assigned serial port by clicking the General tab in the Edgeport utility. You'll see an entry for the NCR printer. Expand the list to see which serial port has been assigned to the printer.

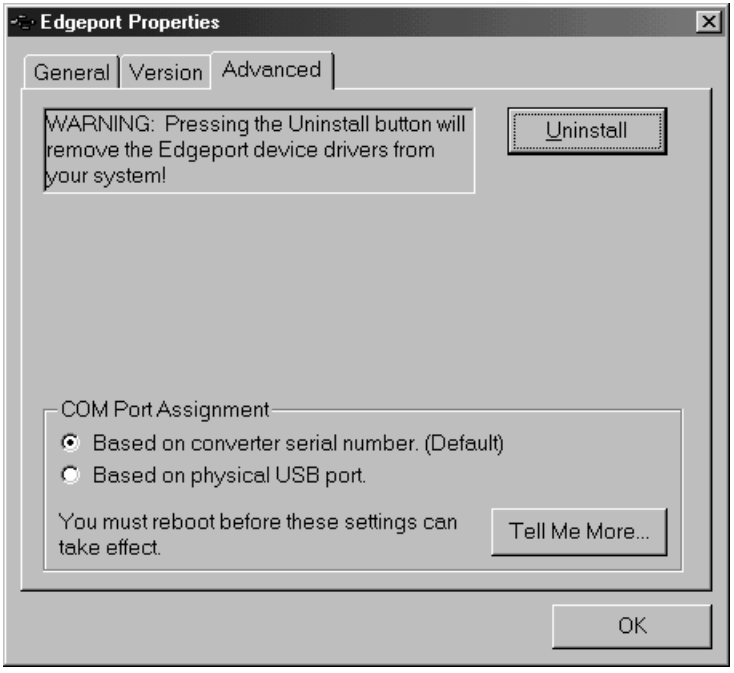
Assigning a serial port to the printer. If the default assignment does not meet the requirements of the installation, you can assign a different serial port to the printer. From the General tab of the Edgeport utility, select the printer and press Configure. Follow the directions on the resulting form to assign a new port to the printer.

Associating a serial port with a specific USB port. (Windows 98 and NT) In certain installations it is desirable to associate a serial port number with a specific USB port. This is particularly important if multiple identical printers are installed on one host. Select the Advanced tab in the Edgeport utility, and follow the instructions for configuring the serial port number based on the physical USB port.

Uninstalling the Drivers

Windows 95/98:

1. Open the Device Manager and make sure "View Devices By Type" is selected.
2. Scroll down to Universal serial bus controller, and expand the list by pressing the "+" symbol. You'll see two entries for your NCR printer.
3. Select the printer name and click Properties.
4. Select the Details tab, then press the Details button to start the Edgeport utility.
5. Click the Advanced tab.
6. Click the Uninstall button and follow the on-screen instructions.



Windows NT:

Windows NT users will need to run the Edgeport Configuration Utility to uninstall the drivers.

1. Press Windows Start Menu button.
2. Choose Programs, then Inside Out Networks Utilities.
3. Choose Edgeport Configuration Utility.
4. Click the Advanced tab.
5. Click the Uninstall button and follow the on-screen instructions.

Troubleshooting

Problem	Solution
Device not working.	Check for conflicting USB devices.
	Check Comport assignment in application.
	Reconnect USB connector to PC.

Frequently Asked Questions

USB Printer Performance Under Windows 95

Normally sending output to a USB printer results in a print speed slightly faster than that obtained using the highest baud rate of 115200 under RS-232. Our performance testing typically yields between 33 to 40 lines-per-second depending on other processes that takes place in the terminal. Under Windows 95 the USB printer yields significantly slow print speed with a maximum output of 25 lines-per-second. This issue is due to the performance of the Window 95 USB Subsystem which when released by Microsoft was not fully implemented, and not optimized. Microsoft recommends upgrading to Windows 98 for USB support. Our USB implementation allows the use of either Windows 98 or Windows NT to obtain the full speed benefits expected of USB.

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